Engineering Library

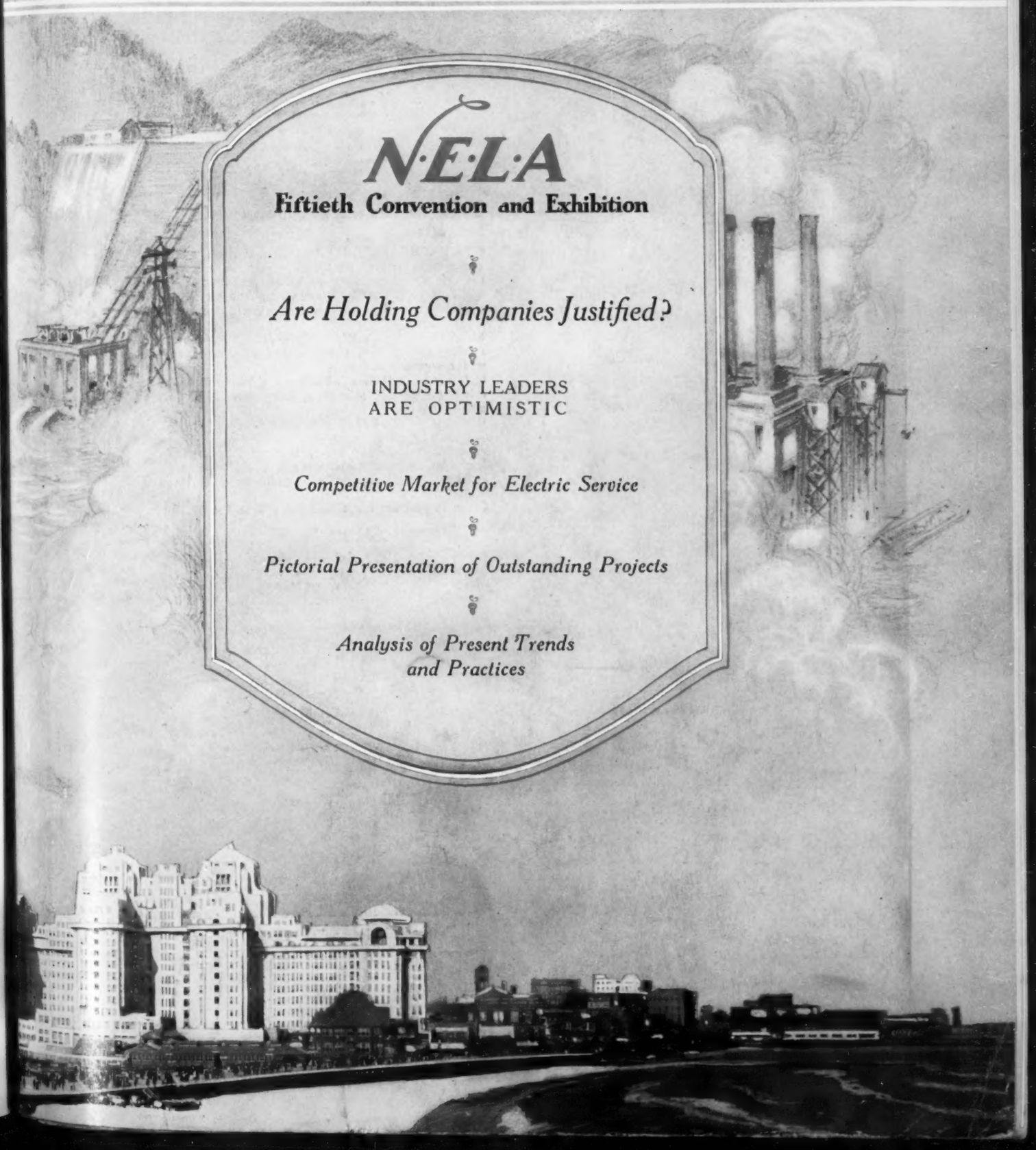
N. E. L. A. Convention Number

MAY 31 1927

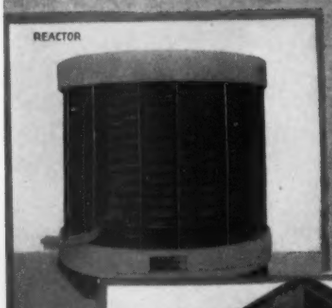
Founded 1874—Fifty-Three Years of Service

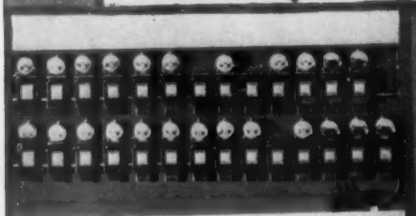
Electrical World

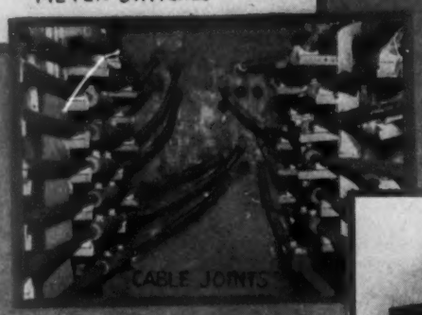
McGraw-Hill Publishing Company, Inc. *May 28, 1927* One Dollar Per Copy

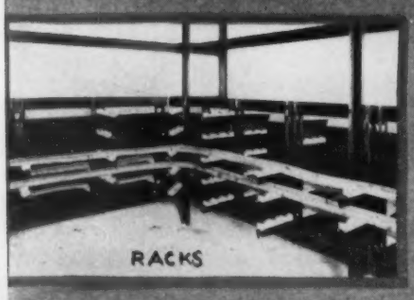


METROPOLITAN
Protective Devices









In Booths
120-122
Atlantic City

These devices will be shown and demonstrated:

CURRENT LIMITING REACTORS used in largest generating and distribution systems to protect the equipment during short circuit stresses.
METER SERVICE SWITCHES accessible or sealed main fuses, with or without accessible branch fuses.
SUBWAY SECTIONALIZING UNITS for connecting sub-feeders, tie-lines and service taps to underground distribution systems.
OIL FILLED HIGH TENSION CABLE JOINTS offering safe and reliable splicing between underground cables.
CONDUIT SYSTEMS providing the ideal conduit for subway distribution—monolithic concrete duct. Also Padlock Meter Seals, Dummy Plugs, Cable Racks both overhead and underground, Fairleaders, Primary Switch Type Cutouts, Meter Connection Test Blocks.
Come in and see our Cable Joint Test Results.

Metropolitan Device Corp
1250 Atlantic Ave.
Brooklyn, N. Y.

Factory of Metropolitan Device Corp.

Vol. 89, No. 22 New York, May 28, 1927 Pages 1101-1180

L. W. W. MORROW Managing Editor
EARL WHITEHORNE Commercial Editor
ALLEN N. PERRY Associate Editor
G. F. WITT'G Statistical Editor
H. M. CAMERON Financial Editor
F. C. WELLS News Editor
EUSTACE C. SOARES Manufacturing and Markets Editor
L. H. CHURCH Assistant Editor

Electrical World

The consolidation of Electrical World, Electrical Engineer and American Electrician

W. H. ONKEN, JR., *Editor*

FRANK R. INNES Western Editor 7 South Dearborn St., Chicago
H. S. KNOWLTON New England Editor 88 Tremont St., Boston
WALTER C. HESTON Pacific Coast Editor 883 Mission St., San Francisco
T. P. KINDIG Assistant Editor 501 Guardian Bldg., Cleveland
PAUL WOOTON Washington Correspondent Colorado Bldg., Washington
B. L. SHEPHERD Southern Editor Alabama Power Co. Bldg. Birmingham

CONTENTS

Editorials 1101

Frontispiece — Atlantic City — Where Utility Men Will Assemble 1104

N.E.L.A. Convention Issue

What Consolidation Brings About 1105

Seven properties consolidated in 1921 have increased net earnings 198 per cent, appliance sales 176 per cent and investment 124 per cent. Average consumption per capita is 1,365 kw.-hr. Production cost halved.

Trend Indications in the Light and Power Industry 1110

By H. M. CAMERON

A gratifying increase is shown in most phases of public utility activities since 1920. Some evidences of dilution are presented graphically.

Industry Leaders Are Optimistic 1113

Financial, public relations, commercial and engineering aspects of the electrical industry are discussed from the standpoints of the banker, utility executive, state executive, manufacturer and utility woman.

N.E.L.A. National Officers and Members at Large 1118

Principles of Group Utility Management ..1119

By HALFORD ERICKSON

Their applications in the Byllesby group. Details of economies in all phases of management and operation made possible through centralized control. Study of a specific case.

National Section Chairmen and Geographic Division Presidents.....1138

The Competitive Market for Domestic Electric Service.... 1139

By COL. C. F. LACOMBE

Budget expenditures of American families measured against prices of electric service. Only 105 utilities of 376 are within reaching distance of the market.

Graphic Illustration of a Small Company's Progress 1148

Four years under holding company control and direction compared with an equal period of isolated management.

Special National Committee and General National Committee Chairmen 1150

Holding Company Operations.....1151

Detailed analysis of economies and service improvements rendered by the United Light & Power Company. Functional organization, policies, savings, financing, sales and other topics discussed in specific terms.

Letters from Our Readers 1162

News of the Industry.....1163

Men of the Industry.....1170

Court Decisions and Commission Rulings...1171

Financial and Statistical.....1172

Ease of Money Market Necessitates Care in Capital Expenditures.....1172

By WILLIAM S. BARSTOW

Over-discounting of future would result in temporary retarding of progress in utility industry. Sound basis for future growth essential.

Manufacturing and Markets.....1176

Construction News 1180

McGRAW-HILL PUBLISHING COMPANY, INC., Tenth Ave. at 36th St., NEW YORK, N. Y.

JAMES H. McGRAW, President
JAMES H. McGRAW, Jr., Vice-Pres. and Treas.
MALCOLM MUIR, Vice-President
EDWARD J. MEHREN, Vice-President
MASON BRITTON, Vice-President
EDGAR KOBAK, Vice-President
C. H. THOMPSON, Secretary

NEW YORK District Office, 285 Madison Ave.
WASHINGTON, Colorado Building
CHICAGO, 7 South Dearborn St.
PHILADELPHIA, 1600 Arch St.
CLEVELAND, Guardian Building
ST. LOUIS, Bell Telephone Building
SAN FRANCISCO, 883 Mission Street
LONDON, 6 Bouverie Street, London E. C. 4

Cable Address "Machinist, N. Y."

Publishers of
Engineering News-Record — American Machinist
Power — Chemical and Metallurgical Engineering
Coal Age — Engineering and Mining Journal
Ingeniería Internacional — Electrical Merchandising
Bus Transportation — Electric Railway Journal
Electrical World — Successful Construction Methods
Industrial Engineer — Radio Retailing
Electrical West
(Published in San Francisco)
American Machinist—European Edition
(Published in London)

Member Audit Bureau of Circulations
Member Associated Business Papers, Inc.
Circulation of this issue, 20,000

The annual subscription rate is $5 in the United States, Canada, Mexico, Alaska, Hawaii, Philippines, Porto Rico, Canal Zone, Honduras, Cuba, Nicaragua, Peru, Colombia, Bolivia, Dominican Republic, Panama, El Salvador, Argentina, Brazil, Spain, Uruguay, Costa Rica, Ecuador, Guatemala, Haiti and Paraguay. Extra foreign postage, $4 (total $9 or 38 shillings). Subscriptions may be sent to the New York office or to the London office. Single copies, postage prepaid to any part of the world, 25 cents.
Change of Address—When change of address is ordered the *new* and the *old* address must be given. Notice must be received at least ten days before the change takes place.

Copyright, 1927, by McGraw-Hill Publishing Company, Inc.

Published weekly

Entered as second-class matter Jan. 20, 1907, at the Post Office at New York, N. Y., under the Act of March 3, 1879.
Printed in U. S. A.

Advertising Index—Alphabetical, 430; Directory of Engineers, 56, 57; Searchlight Section, 125-146

PUBLISHER'S *Announcement*

WHEN the N. E. L. A. Convention comes around each year the electrical industry looks forward to seeing what the editors of *Electrical World* have contributed through their N. E. L. A. issue. This editorial report on the industry has come to be recognized as valuable and authoritative and greatly supplements the activities of the convention itself.

For many months the editors of *Electrical World* have been studying the light and power industry with the idea of developing again this year an N. E. L. A. issue which would contribute to the solution of the outstanding industry problems. As a result of these studies, the editors have concentrated on three major objectives.

1 The economic and service justification for the holding company and its orientation in the industry.

2 The financial and business trends in the industry in terms of unit values and the interpretation of the trends.

3 The domestic market for electricity and the existing and possible exploitation of this market.

IN this issue will be found the product of long preparation. Fourteen editors in all sections of this country have exercised their talents and drawn upon all available industry leaders to create the articles presented in this issue. Months of detailed work on the part of both editors and contributors have gone into these articles developing the specific data and experience which would best contribute to the subjects considered.

The hearty cooperation of the men in the industry and the full strength of a staff organization imbued with the spirit of service have made possible this N. E. L. A. issue of *Electrical World* for 1927. The editors hope that it will be helpful to the industry.

Electrical World

Electrical World

Published by McGraw-Hill Publishing Company, Inc.
W. H. ONKEN, JR.
Editor

VOLUME 89 — *New York, Saturday, May 28, 1927* — NUMBER 22

The Case of the Holding Company

THE principle of larger volume and diversification as applied to various risks in order to stabilize results through the law of averages is not new. It has been followed successfully for years in insurance and banking circles and has been tried more recently by holding and investment companies in the electric light and power industry. Success, however, cannot be assured from a formula, and while the proponents of holding companies in the electric public utility field have faith in their corporate creations, the public is less sanguine.

From opinions backed by prestige sparks fly to ignite the magazines of belief in the public mind. In the halls of Congress and in the marketplaces men of prestige have challenged the economic necessity for the existence of holding companies in the utility business. They have asserted that holding companies exist to exploit and not to serve the public. Sparks flew into the receptive public magazines, and, if an explosion was averted, smoke at least resulted.

The politician does not accept the principle which says it is wrong, always wrong, everywhere and for every one, to believe anything upon insufficient evidence. He knows that the public is satisfied quite often with the prestige of his opinion and asks for no evidence. And, unfortunately, too many men in high places are quite satisfied to form their opinions upon the basis of arguments which they think will make good political capital. If a Pyrrhonean skeptic asks them, "How do you know?" their reason is satisfied with a few arguments.

CHALLENGE of the justification of holding companies in the utility business is welcomed by the electrical industry. In this issue a few of the many facts and experiences of the industry with holding companies are recounted by men of integrity thoroughly conversant with the industry and experienced in holding-company operations. Many more issues could be filled with similar examples of the good work of these groups. Evidence in abundance is available to enable the large majority of holding companies to come before the bar of public opinion with a demonstration of clean hands.

If this industry were operating with five thousand separately owned and managed utilities, the waste in money, in man power and in ill-directed developments would be enormous and service standards would be much lower than they are. The holding company as a fiscal agent, as a manager and consultant, as a commercial, operating and financial specialist, brings to bear the highest grade of executive talent upon the development of the smallest utility property. It makes possible enormous savings by bringing about interconnections and bulk-power steam and hydro developments. It gives financial stability to the industry and makes possible the raising of funds which are necessary to service developments.

However, if properties are absorbed merely for the sake of acquisition and with little regard for the prices paid and less for the availability of the properties in any well-conceived and properly managed system, trouble is inevitable. All of the advantages of the holding company may easily be offset or destroyed by incompetency and by the machinations of the exploiter and despoiler. Murder will out. Crookedness and exploitation cannot endure in big business, especially in big business that is conducted under public regulation and in the limelight of public opinion.

THE holding company has been evolved as an economic asset leading to better and cheaper electric service. By and large, the history of the holding company has been one of accomplishment, as numerous communities are able to testify. The scalawags who have brought reproach on the industry and capitalized their nuisance value have for the most part been driven out, or have seen the light and discovered that more lasting success is assured through the adoption of sound public service principles.

The holding company in the electric public utility field has evolved into a stabilized economic structure, imparting help and strength to its individual companies. Honestly managed and financed, it has been a boon to the industry and to the communities served by it. That it should be subject to misunderstanding and attack is natural. Legal considerations and mortgage clauses necessitated some degree of complexity in the early formation of many holding companies, and the idea of pyramiding became prevalent in the industry. The holding company will work out effectively when it has no pyramiding of control or securities, but operates as a single utility having direct contact with subsidiary operating companies. The challenge to the holding company, on the whole, has been good for the electrical

industry in that it has made that industry consider the new organisms, kill those that were weak and ill-conceived and place the others in shape to do the work they are fitted to do.

International Aspects of Electricity Supply and Equipment

THE significance of the International Economic Conference just ended at Geneva ought to impress itself on the electrical industry, many of whose operations are international in scope and hence call for international technical collaboration and international agreement. Telegraphy, for example, although early recognized as an important medium of intellectual and economic collaboration between nations, only made worldwide progress after the formation, in 1875, of the Universal Telegraphic Union, which is still functioning. To this body international telephony has now been intrusted, and into its keeping international wireless may some day also be given.

In the domain of electric power production increased international collaboration is essential, for, although the League of Nations has not progressed far in its consideration of electric transmission and hydro-electric developments affecting more than one state, the problems connected with the export of electricity have been temporarily adjusted by the nations concerned. Thus Switzerland sends electricity into France, Germany and Italy; Norway transmits it into Sweden and Denmark, and Canada sends it into the United States. In this connection the work of the International Electrotechnical Commission on nomenclature, power voltages, standard regulations and so forth is most noteworthy, insomuch so that efforts are now being made outside of League influence to establish an international standards committee.

It is on electrical apparatus and appliances, however, that more needs to be done, for the economic interests of countries importing electrical goods demand standardization. So far as international industrial combinations are concerned, there are already two in existence in the electrical industry, those concerned with wireless and incandescent lamps. The four great world wireless firms operating in England, Germany, France and the United States have pooled their patents and devote the funds heretofore required for litigation to technical improvements.

The greatest industrial combination, however, exists in the manufacture and sale of incandescent electric lamps. There is an international incandescent-lamp agreement, the aim of which is to insure profitable use of manufacturing facilities, economic advantage from the division and allotment of markets, greater efficiency in electric lighting and greater use. Patents and experiences are pooled, and, although efforts at a single sales organization have failed, the agreement is sufficiently elastic to permit co-operative selling. Price fixing is not made a condition of the agreement, but is left to the organizations created for the several countries. To insure the best lamp at the cheapest price every effort is made toward standardization and uniformity. A special organization, the Phoebus Company at Geneva, supervises and executes the various provisions of the agreement which bind American, German, Dutch and other manufacturers of incandescent lamps.

International organizations and agreements exist, however, only for wireless telegraphy and for incandescent lamps, chiefly because of patents, and it is questionable if for some time to come any additions will be made to this list. It would, of course, be desirable if the status of exported electricity could be fixed. This question is, however, more political and diplomatic than commercial, so that situations like that between Canada and the United States over Canadian power exported to the United States and taxed can best be settled by the countries themselves. It is rather doubtful if there ever will be any great international linking up of water and steam power stations in Europe, because few countries possess sufficient water power for their own needs. However, there will be exchange of apparatus; hence the necessity of standardization of voltage, frequencies, etc., on supply circuits and transmission lines. Although the International Economic Conference added little to what has already been done, the further discussion of problems must, of course, be beneficial.

Take Guesswork Out of Business

MAN-MADE laws cure no economic ills. Out in the corn belt the making of sugar, wallboard, artificial silk, paper, twine and heat-insulating materials from cornstalks will do farmers more good than any laws Congress may pass. What is needed in agriculture is a few more quiet scientists who devote their minds to productive chemical research instead of a host of demagogues and quacks who devote their mouths to destructive politics. The parallel holds for many economic ills in the electrical industry.

Beyond all other businesses, the electrical industry should pride itself on the intelligent application of knowledge to its activities. It is based on a precise science that has tangible form only in the minds of engineers and scientists. It measures its service on accurate meters and collects its revenue through measurements. Empiricism is an unthought-of approach to the development of the art and should be obliterated from its business activities.

Each utility should have an executive plan for growth. An executive should know where he is going and how he is going to reach his objectives. Every phase of the business is capable of measurements which will permit predictions to be made with extreme accuracy. The growth of loads, the construction requirements, the organization functions, the financial necessities and the annual balance sheets which give earnings and expenditures can be correlated and predicted. A system plan which co-ordinates and focuses the business is an essential utility tool.

The rush to supply service, the pressing construction programs, the urgency of immediate financing and the hidebound conservatism of the past should not prevent utility executives from conducting their business according to a plan which eliminates waste and false motions. Hit-or-miss business practices nullify fundamental principles of good business, and the day is past when a utility executive can say, in the manner of Madame de Pompadour, "After me the deluge!"

From 1923 through 1927 the utility industry will have sold more than six billion dollars in securities, received a gross revenue of seven and one-half billion dollars and

spent about four billions for property additions. It will have sold three hundred billion kilowatt-hours, added ten million kilovolt-amperes to its generating capacity and served seven and one-half million new customers. These figures show that the light and power industry is big business and should use big business methods.

Holding-company executives first realized the necessity for eliminating guesswork from this business. They set out to plan property developments and to eliminate waste. In any analysis of utility affairs major credit should be given the holding-company executives for the introduction of sound business principles into an industry which had grown up as a multitude of separate entities. These men have given leadership and planning whereby all properties have benefited. They first sensed the necessity of an orderly program, and it is largely due to their influence that guesswork is becoming very much a thing of the past in utility operations.

Commercial Significance of the Coming Power Convention

PROGRESS in any industry is the product of education more than of events. Looked at in this way, the year just about to close for the power companies with the convention of the National Electric Light Association at Atlantic City has been important and is worth considering. There have been no spectacular developments, no radical changes in the situation, but a trend in the prevailing state of mind has been apparent. A new direction has become evident in the thinking of the industry that is profoundly influencing events.

Through all its forty years of preparation the power industry has been developing physical resources. It has been building power houses, substations, transmission and distribution lines, a great system for the production and delivery of electric service. What has all this building been in preparation for? The objective has always been clear-cut in the minds of the leaders of the industry. It was the dream of the pioneers that some day electricity would become the universal servant of mankind and bring the advantages of electrical equipment for labor saving, comfort and convenience into every home through the many applications of light, heat and power. And electrical men have held to this ideal with never-flagging enthusiasm and purpose. But the astonishing, cumulative growth of the power industry has continued this era of preparation with an almost indefinite prospect of further growth. The popularity of electricity has been such that it seemed as though the business of the central station would permanently consist of the accumulation of customers on an ever-increasing scale and the expansion of the plant in order to provide for them.

And then came the turning of the corner. With American industries roughly 45 per cent motorized—those that are connected to central-station lines—and three million commercial lighting customers using the service to roughly 60 per cent of its possibilities, as men see it now, it suddenly dawned on the industry that the end of the large-scale house-wiring movement had come. In 1924 about 1,783,000 houses were wired and connected to the lines. Next year the total was 1,293,700 odd. Last year 1,222,500 were wired. And with 15,923,000 houses connected there now remain but two million unwired houses within reach of power lines. In short, if the growth of the industry is to continue on a large scale, the time has come at last when the power industry must turn from the practice of accumulating customers to an intensive system of selling more service to existing customers in the residence field as well as to industry. In the fact that the use of electric service in the homes today measures but 7 per cent of present possibilities, in large part because of inadequate wiring installations, may be glimpsed something of the job that lies ahead.

The power industry now finds itself inside the threshold of its era of marketing and is commencing to realize that, after years of absorption in the problems of engineering, operating and finance, the central-station executive must begin to turn his mind to the building of a market. For his responsibilities in the coming years are going to be increasingly commercial. This was indicated impressively at the N.E.L.A. convention last year, when the sales managers of the industry delivered a declaration of principles calling for a more liberal and progressive policy toward the sales function of the utility. Such practical considerations as the need for more adequate sales organizations were stressed, and also the desirability of recasting rates to help promote the fuller use of electric service. And the outstanding executives of the industry met the challenge of the sales managers with a sweeping indorsement that called for action and sent the commercial men back home tremendously encouraged, but conscious of a large and very conspicuous responsibility.

The influence of this new situation has been well evidenced in the affairs of the N.E.L.A. Commercial Section this year. Under the chairmanship of Past-president James E. Davidson, there has been a new birth of confidence and purpose. We have seen a promotional rate committee organized and put to work. We have seen a committee on trade relations undertake to clear away the troubles between the central-station appliance department and the other merchants. Another committee has launched a broad refixturing campaign as an approach to better home lighting. Wiring has received particular attention, including a joint industry conference, which is giving impulse to a movement for the rewiring of homes. Competitive power and industrial heating have both seen intensified purpose and activity, and a study of the opportunities for the improvement of load factor has had major attention. It has been a year of commercial thinking in the power industry, and not alone by commercial men. President Pack himself has been the chief standard bearer, stressing repeatedly that the old days of isolation are done and that the central-station man must now come into the marketplace and develop his business with the same eager application that in past years he has given to the building of his property.

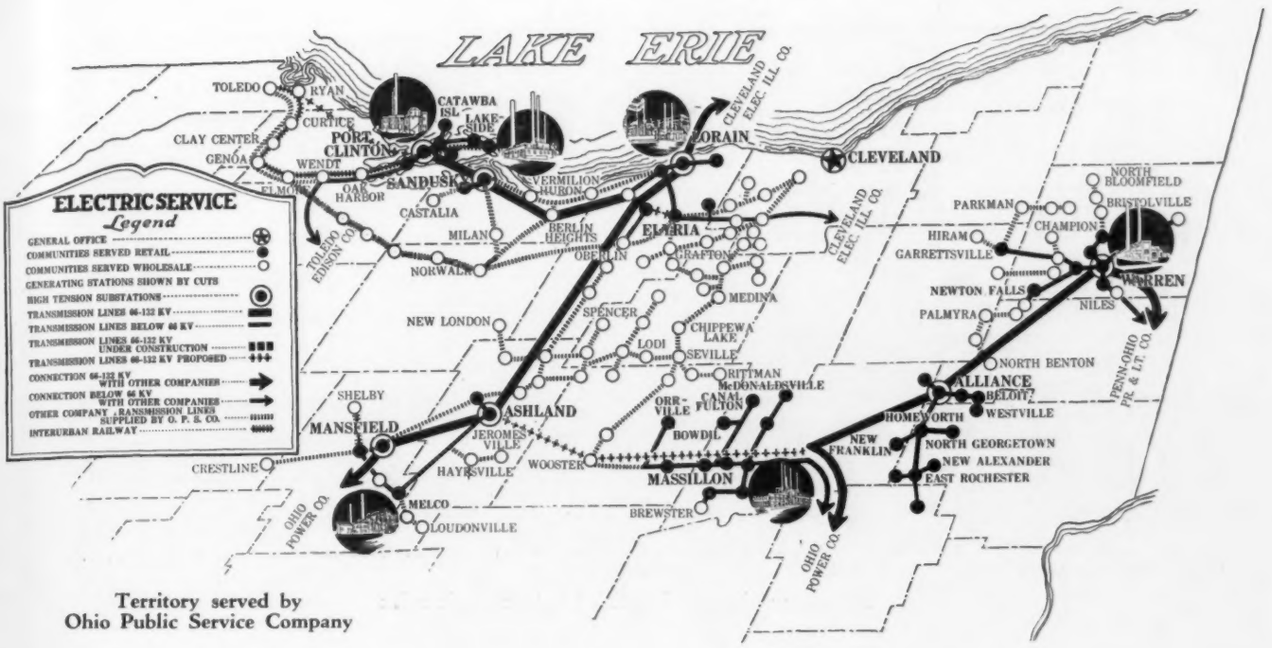
The coming fiftieth convention of the light and power companies promises to be both interesting and fruitful. A strong program featuring many distinguished speakers, a mammoth exhibition of electrical apparatus and appliances and a bumper attendance will combine to give further impetus to the growing realization that, after all, there is involved here more than a profession, more than a specialized industry. Before all, it is a great American business enterprise, dependent for the extent and success of its service to the public upon the business acumen of its executives.

Atlantic City—

Where Utility Men Will Assemble

June 6-10

BY JUNE 4 or 5 thousands of utility men from all over the country will begin to gather at Atlantic City to take stock of their accomplishments and plan activities which will carry the electrical industry forward to new records. Of equal importance will be the renewed opportunity to rub shoulders with old friends and inspect the results of manufacturers' efforts to meet utility needs.



Territory served by
Ohio Public Service Company

What Consolidation *Brings About*

Seven properties consolidated in 1921 have increased net earnings 198 per cent, appliance sales 176 per cent and investment 124 per cent. Average consumption per capita is 1,365 kw.-hr. Production cost halved

IN 1921 there were seven Doherty companies supplying utility service in northeastern Ohio. Each of these utilities was limited to the service of a local community and was handicapped by local conditions. So in 1921 the Ohio Public Service Company was formed to make possible the development of the entire territory on a unified basis that would make for better and cheaper service to the public.

On Jan. 1, 1927, the total kilowatt-hour sales in the territory had increased 266.27 per cent. The several classes of business and the percentage increases were as follows:

	Per Cent		Per Cent
Street lighting	125.18	Power	241.16
Commercial use	168.19	Other utilities	667.66
Domestic use	231.51		

The total gross earnings of the electric department increased 142.48 per cent, and the average rate per kilowatt-hour decreased 33.9 per cent. Subdivided into classes, the increase in gross earnings was as follows:

	Per Cent		Per Cent
Street lighting	121.93	Power	105.14
Commercial use	141.88	Other utilities	376.91
Domestic use	223.62		

The number of customers served increased 102.94 per cent, while the population of the territory increased only 39.23 per cent. The increases in the number of customers by classes are as follows:

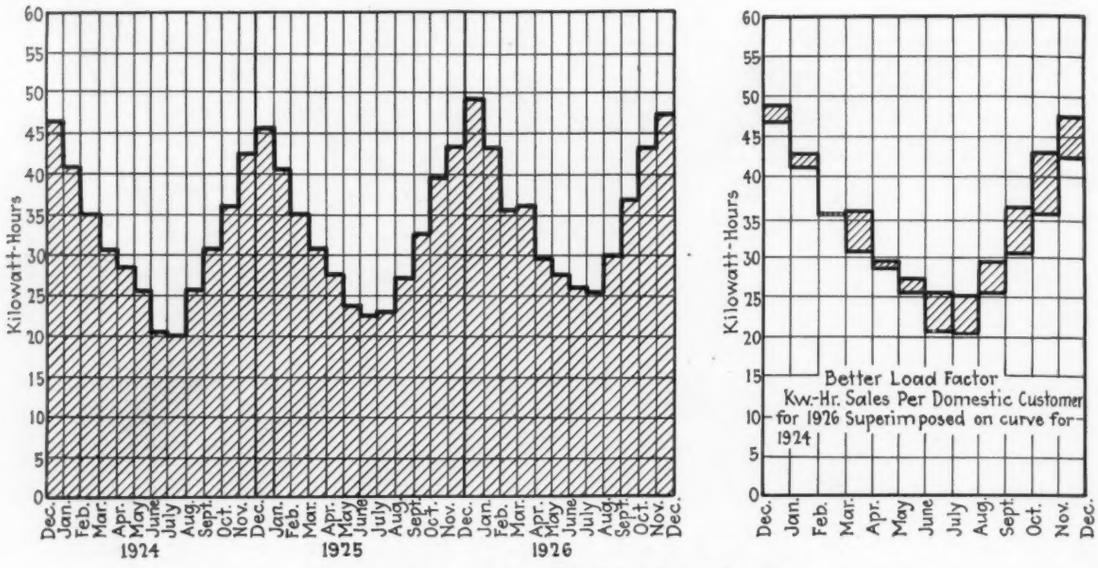
	Per Cent
Domestic	108.11
Commercial	85.91
Power	53.00
Other utilities	30.77

In addition to serving more customers in the territory, it has been a policy of the utility to increase the use of service per customer through adoption of a proper form of rate and through an active selling program. For example, the sale of appliances in homes increased 175.61 per cent, and the sale of these appliances during the year 1926 brought in a gross merchandise revenue that amounted to $1,486,650.

The 130,000 kw. of generating capacity is scattered among eight stations, and many units are small, old and comparatively inefficient. Yet with these handicaps the total production cost of energy compares favorably with that of other utilities. A 20,000-kw. turbo-generator is the largest unit and the 25 units on the system average approximately 5,200 kw. and have an average age of 7.5 years.

If the production cost per kilowatt-hour in 1921 be taken as 100, this cost in 1926 was 47 and the average over the five years was only 57.

A corresponding efficiency may be noted in distribution, metering, billing, sales and other departments.

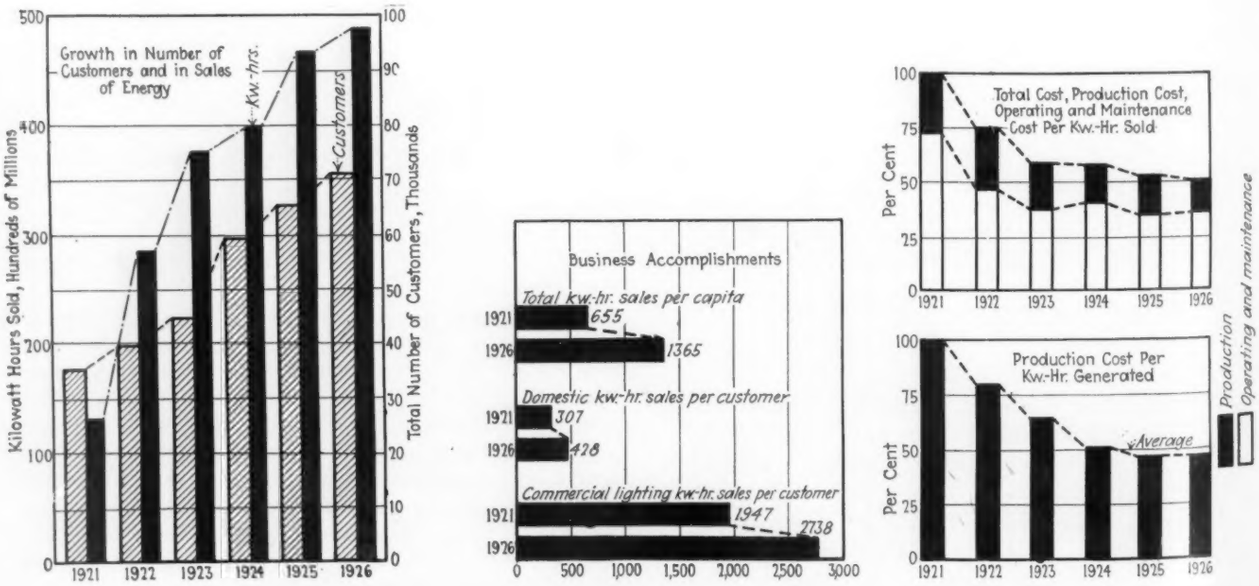

Kilowatt-Hours
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
1924
1925
1926
Better Load Factor
Kw.-Hr. Sales Per Domestic Customer
for 1926 Superimposed on curve for 1924

Summer valleys being filled by domestic sales

Table I—Customer Data

Year	Population Served	Population Per Customer	Total Number of Customers	Number of Commercial Customers	Number of Domestic Customers	Number of Secondary Power Customers	Number of High-Volt Customers Under 500-Kw.	Number of High-Volt Customers Over 500-Kw.	Number of Other Company Customers
1908	13,400	20.46	655	.....	.....	.....	...	..	..
1918	155,280	7.92	19,597	.....	.....	.....	...	..	..
1921	175,541	4.96	35,278	.....	.....	.....	...	..	..
1922	180,562	4.54	39,806	5,563	32,896	1,189	125	21	12
1923	187,493	4.20	44,646	6,277	36,928	1,264	142	21	14
1924	220,841	3.70	59,878	8,215	49,873	1,581	163	26	20
1925	230,328	3.54	64,989	9,207	53,894	1,656	178	33	21
1926*	241,930	3.41	71,022	9,498	59,619	1,650	207	31	17

* Partly estimated.



Energy use per customer stimulated to reduce dilution by new customers. Production cost steadily reduced

The cost per kilowatt-hour sold in 1921 may be taken as 100, in which case the corresponding cost in 1926 was 58, and the average over the five-year period was 63.5. Less than 10 per cent of the energy generated is lost between the switchboard and the meters of the customers. The system has been placed in first-class condition and major transmission lines are built to serve loads that may be obtained in the near future.

Cost and Returns

In order to care for system expansion the investment in the property has been increased 124.09 per cent since 1921. That this capital was invested wisely is indicated by the fact that the gross earnings increased 142.48 per cent and the net earnings 198.26 per cent.

Nor should it be forgotten that many intangible improvements have been made that make for better public service and enhance the standing of the company. Customer-ownership sales have been pushed very successfully. Relations with banks and communities have been improved. Service has been extended into rural areas and every possible opportunity for bettering utility service has been grasped. The results show in more ways than as dollars on the balance sheet.

Classification of Sales and Customers

The percentage of kilowatt-hour sales to the several classes of business has been fairly constant and is as follows:

	Per Cent		Per Cent
Municipal	1.00	Power	76.50
Commercial	4.25	Other utilities	14.00
Domestic	4.25		
			100.00

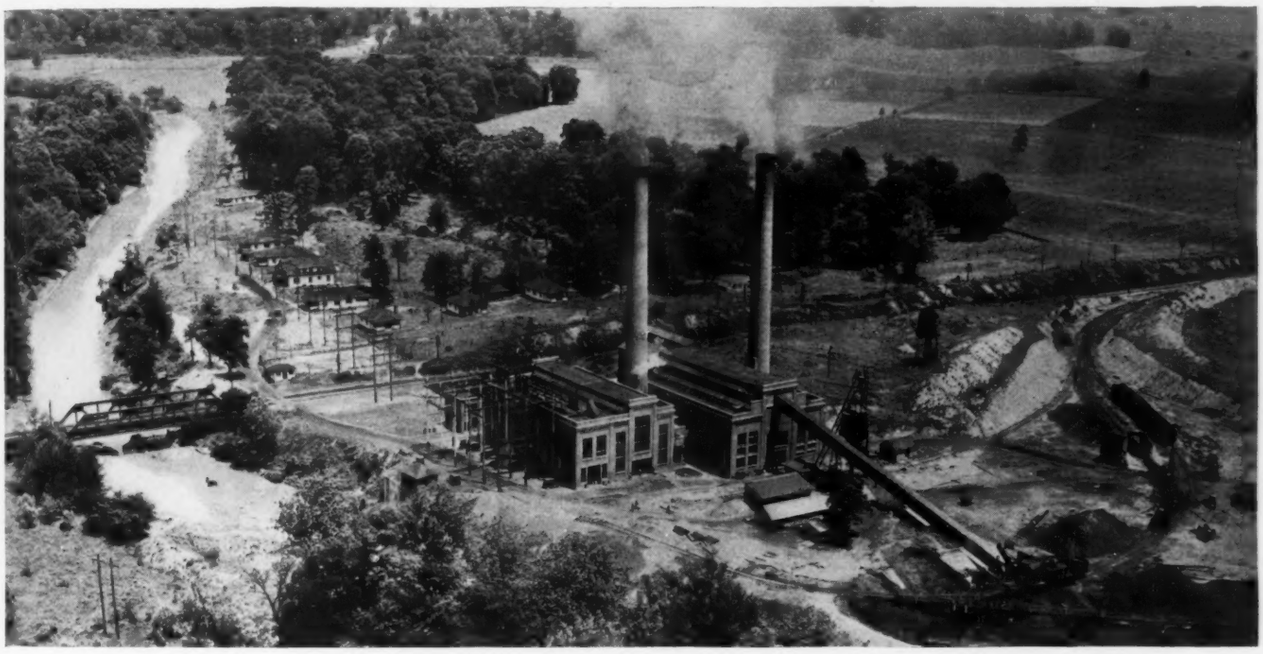
There has also been a fairly consistent percentage relation of each class of customer to the total number of customers. These relations are as follows:

	Per Cent		Per Cent
Commercial	14.00	Power	2.80
Domestic	83.20	Other utilities	0.00
			100.00

Significant data on the results achieved by selling efforts are as follows:

	1921	1926
Ratio of population to customers	4.98	3.41
Average annual kilowatt-hour sales per domestic customer	307	428
Average annual sales per commercial lighting customer	1,947	2,738
Kilowatt-hours of street-lighting sales per capita	18.7	21.7
Total kilowatt-hour sales per capita	655	1,365

The table below gives recent data on population and number of customers in the several communities served by the Ohio Public Service system.



One of the several important stations strategically distributed over Ohio Public Service system (Mansfield)

The average number of residential customers in 1926 was 57,969. These customers bought a total of $1,247,500 worth of electrical merchandise, or $21.52 per customer. Each residential customer used 428 kw.-hr. on the average in 1926 at an average rate for domestic service of $0.0749. The increase in kilowatt-hour sales in 1926 over 1925 was 9.8 per cent. The kilowatt-hour sales per domestic customer were carried on in a manner to give a net profit of more than 11 per cent in 1926 and 75 salesmen were employed in continuous sales efforts.

Community	Population	Total Customers	Population per Customer
Massillon	23,750	8,931	2.66
Elyria	24,500	7,126	3.44
Port Clinton	6,650	2,688	2.47
Sandusky	24,900	7,506	3.32
Mansfield	32,500	10,380	3.13
Alliance	37,250	8,941	4.16
Warren	38,230	12,140	3.15
Ashland	10,350	3,331	3.12
Lorain	43,800	9,979	4.38
	241,930	71,022	3.41

History of Territory

In 1918 there were fourteen electric light, power and railway companies operating in the territory now served directly and indirectly by the Ohio Public Service Com-

pany. The corporate names of these operating companies are given in the following listing:

1. The Trumbull Public Service Company.
2. The Alliance Gas & Power Company.
3. The Massillon Electric & Gas Company.
4. The Richland Public Service Company.
5. The Ashland Gas & Electric Company.
6. The Lorain County Gas & Electric Company.
7. The Utilities Construction Company.
8. The Sandusky Gas & Electric Company.
9. The Northwestern Ohio Railway & Power Company.
10. The Port Clinton Electric Light & Power Company.
11. The Marblehead Power Company.
12. The Cleveland, Southwestern & Columbus Railroad.
13. The Stark Electric Railroad Company.
14. The Lake Shore Electric Company.

2. Western Division:

Edgewater station at Lorain.
Lakeside station at Lorain.
Melco station at Mansfield.
Cleveland Electric Illuminating Company at Lorain.
Ohio Power Company at Mansfield.
Lawrence Street station at Sandusky.
Port Clinton station at Port Clinton.
Toledo Edison interconnection at Ryan.

At the present time a 132-kv. transmission line connects Warren to Alliance and Canton, and another 132-kv. line joins Ashland, Mansfield, Lorain and Sandusky. A 132-kv. line from Canton to Ashland will be completed during 1927. This will completely interconnect the whole system at 132 kv. The line from Lorain to Sandusky is scheduled to be extended to Toledo in 1927-1928.

What consolidated company effort can accomplish in attractive salesrooms (Alliance, Ohio)

In 1921 the first seven of these utilities were merged to form the Ohio Public Service Company. This company absorbed the next three in 1924, and in 1925 the Marblehead Power Company was purchased. The remainder of the companies are still operating, but purchase all their energy from the Ohio Public Service Company with the exception of the Stark Electric Railroad Company and the Lake Shore Electric Company, which generates some of its own energy and buys the remainder from the Ohio Public Service Company.

Present System

The Ohio Public Service Company system may be considered as made up of two divisions from the standpoint of interconnected generating stations and interconnections with neighboring utilities and other sources of electricity. These are as follows:

1. Eastern Division:

Mahoningside station at Warren.
South Erie station at Massillon.
Ohio Power Company interconnection at Canton.
The Central Alloy Steel Company at Massillon.
The Trumbull Cliffs Furnace Company at Warren.
The Pennsylvania-Ohio Power & Light Company interconnection at Niles.

Customer Ownership

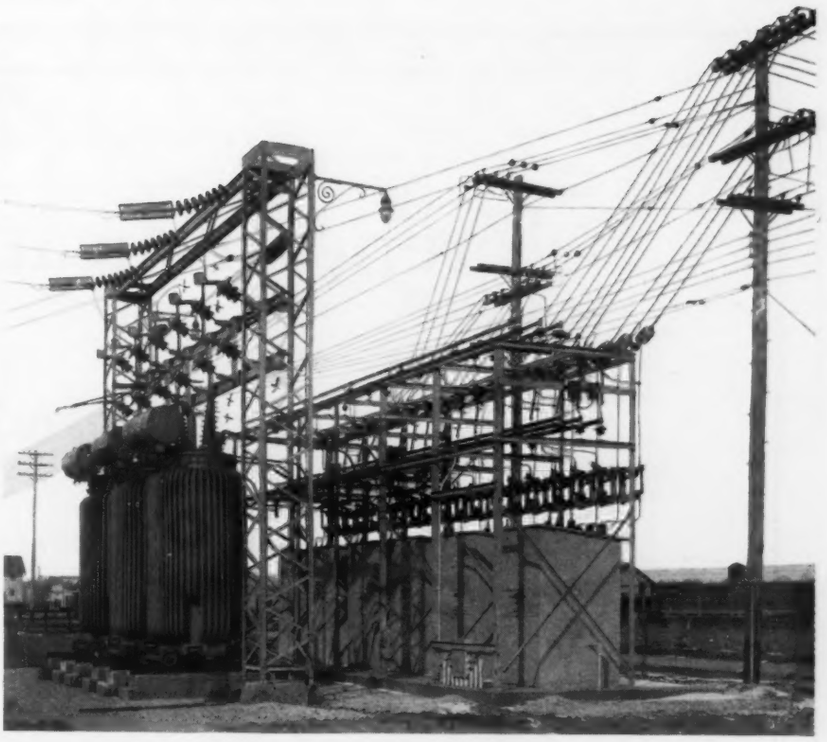
In the fall of 1922 all employees participated in the sale of more than a million dollars of preferred stock to customers and since that time with six employee campaigns there has been sold to customers a total of $5,642,000 of preferred stock. In 1923 a full-time security sales department was organized, and in three years this has sold securities to the amount of $8,200,000. Thus in five years a total of $13,842,000 worth of securities has been sold to more than 15,000 customers. This business has been developed at present so that a total of $3,000,000 worth of securities per year can be sold to customers very readily. Customer-ownership sales have proved very valuable in developing intimate contacts between the utility and the customers and thus have improved public relations. This business has also given a sound investment opportunity to many customers and has helped create an idea of the value of saving among the utility customers.

In 1921 the 35,257 customers on the system bought 130,025,500 kw.-hr. of energy. Through aggressive

selling an increase of more than 20 per cent a year in energy sales has been secured and in 1926 the 71,022 customers purchased 465,349,872 kw.-hr. This corresponds to 655 kw.-hr. per capita in 1921 and 1,365 kw.-hr. per capita in 1926. Selling efforts have been balanced, since the percentage of sales to different classes of customers has been about constant. The distribution of sales to the several classes of customers over the period is shown in Table I.

An idea of the merchandising business done in 1926 is given in the following table:

Item	Number Sold	Item	Number Sold
Fixtures	8,125	Percolators	545
Kitchen lights	4,750	Toasters	540
Portable lamps	2,978	Radio sets	405
Flat irons	2,698	Heating pads	349
Ice machines	1,709	Curling irons	304
Washers	1,295	Ironers	200
Wiring jobs	898	Waffle irons	331
Sweepers	887	Table stoves	99
Room heaters	714	Electric ranges	36
Incandescent lamps		Retail value	$53,000



Stepping down from 66 kv. to 23 kv. at substation in Ashland

MANAGEMENT AND POLICY

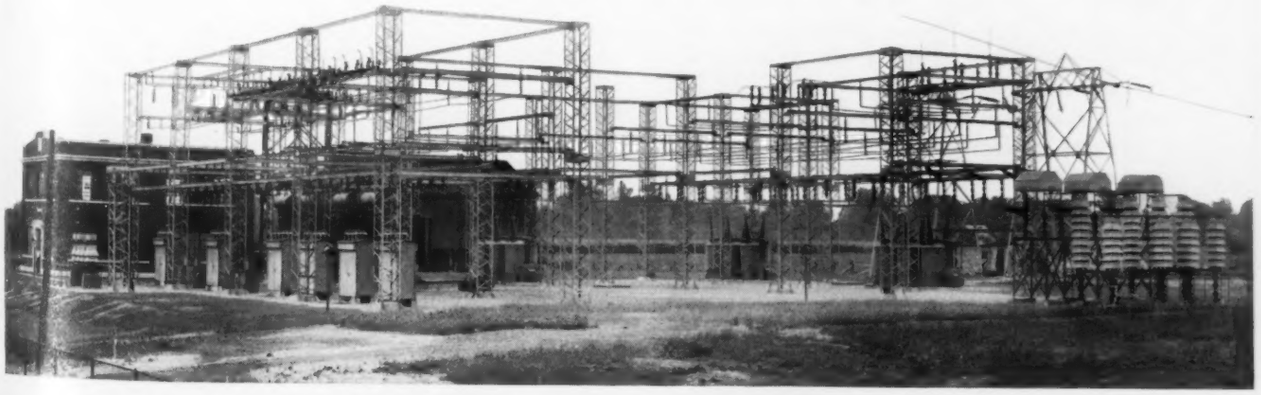
The Cities Service Company is the holding company that controls the Ohio Public Service Company. The headquarters staff of this organization has given invaluable aid to the local men in building the system. In finance, accounting, engineering and commercial aspects of the business, experts from headquarters have given advice and help and the principles of the Doherty organizations have been applied to the local properties with splendid results, as may readily be judged from this survey of accomplishments.

The use of detailed load surveys, an accurate budget system and a long-time plan for system development have enabled the local property to build intelligently. During the five-year period from 1922 to 1926 inclusive gross earnings were estimated. The actual gross for this period was 101 per cent of the estimate. The net earnings estimated for the period were 99.6 per cent of the actual. Thus long-term planning and budgeting enables the executives to check operations very closely.

For the services of the holding company headquarters staff in finance, construction, accounting and management the local company pays a certain percentage of the gross operating revenue and other sums that are determined by direct services rendered. In the five-year period from 1922 the local company paid the holding company 1.6 per cent of the gross revenue, 0.9 per cent of the gross for direct service on new construction and 0.8 per cent of the gross for direct services in financing, engineering and commercial aspects of the business. Thus the total holding company charge was slightly more than 3 per cent of the gross revenue. This is a small item when compared with the expert aid rendered the local property and the reduction in local personnel which it made possible.

CONCLUSIONS

Better service to customers has been the incentive in the policies and management accomplishments of the Ohio Public Service Company. All economies obtained have been shared with customers and service has been improved wherever possible. A partnership relation between the management and the customers has been maintained in the development of the property, and the future holds many opportunities for still further improvements in operations.



Important load centers between stations are served from such substations as this at Alliance (132/66 kv.)

Trend Indications *in the* Light and Power Industry

By H. M. Cameron
Financial Editor *Electrical World*

A SURVEY of the electric power and light industry for the past six or eight years shows some interesting trends. Among the favorable factors is the rapid increase in gross and net revenue in relation to the amount of money invested in the industry. Also the rapid increase in the number of customers in all departments is a favorable indication of progress in giving electric service. On the other hand, there are indications of some dilution in the volume of service sold per customer and in the revenue per dollar invested in the industry.

Using 1920 as 100, the growth in gross revenue has been more rapid during the past eight years than has the growth of capitalization. In other words, the annual increments of revenue have been greater than those of new capital. Furthermore, revenue has increased more rapidly than operating costs, the latter having been more or less constant after reductions had been accomplished in many directions. Fig. 1 shows a trend in these three factors during the period that is not apparent from a study of the actual dollar aggregates of capital, gross revenue and operating costs. Fig. 2 shows the relation of these various items in dollars over the period of years under discussion. Naturally, the capitalization trend appears to increase more rapidly than the gross revenue trends, but the percentage increases in the latter are greater than in the former. This is true also in the case of net revenue.

One of the significant trends is that of gross revenue per dollar invested and similarly per dollar of capitalization. The revenue per dollar increased rapidly until 1923; since that time there has been a decline in gross revenue per dollar invested but an increase in the gross revenue per dollar of capitalization. Large investments in the industry during 1923 and later to extend service into lightly loaded areas and better to service existing areas have influenced this development.

One phase of the industry that requires some special attention is that the kilowatt-hour sales per dollar of new capital are very much smaller today than was the case five or six years ago. In 1922 each dollar of new capital increased the output by 16.4 kw.-hr., whereas at the beginning of 1927 each additional dollar increased the output by only 9.2 kw.-hr. The low point was reached in this respect in 1923, when the addition per dollar was 5.5 kw.-hr.; since that time there has been a gradual increase. This situation has a very direct bearing upon the present easy flow of capital into the public utility industry and therefore requires an acceleration in selling effort to counteract the trend. This trend should be noted in connection with the fact that the gross revenue per kilowatt-hour sold has declined steadily since 1920.

An interesting situation is revealed by a study of the kilowatt-hours sold per customer for the whole industry and for power and lighting customers respectively. In the case of the lighting customers there has been a decline in kilowatt-hours sold since 1921, but in the case of the power customers the trend has been steadily upward since that time. The combined figure for the whole industry is more or less on a level, having reached the peak in 1923. Fig. 7 shows the increase in the number of customers, domestic lighting customers, commercial lighting customers and power customers respectively during the period under review.

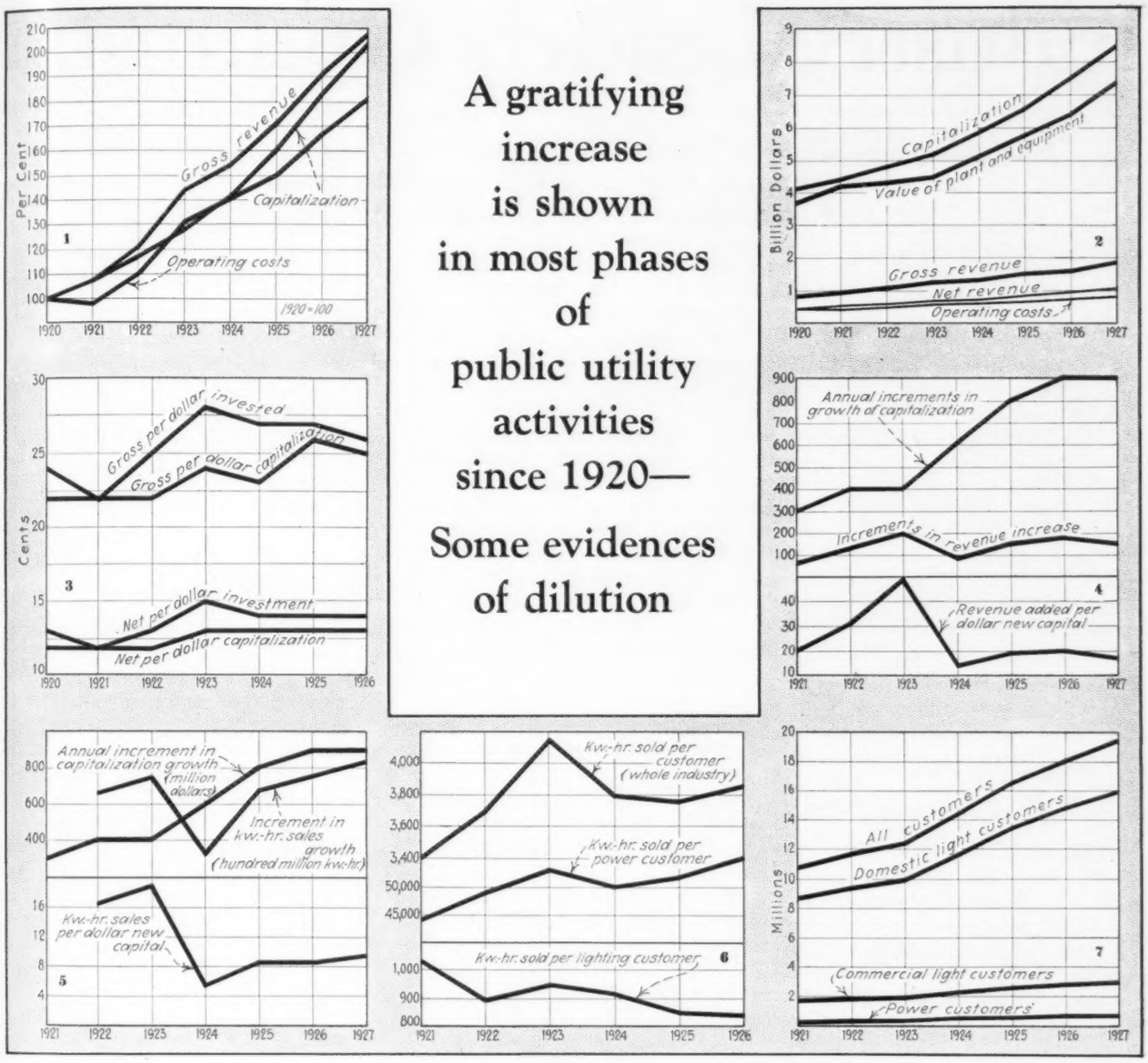


Fig. 1.—Revenue and Capital

The gross revenue is increasing at a greater rate than capitalization or operating costs.

Fig. 2.—Capital and Plant Value

Capitalization is increasing at a faster rate than the value of plant and equipment.

Fig. 3.—Revenue Per Dollar Invested

Since 1923 there has been an increase in gross revenue per dollar of capitalization, but a decrease in gross revenue per dollar invested in properties.

Fig. 4.—Increments in Capital and Revenue

Increments in growth of capitalization are increasing, whereas increments in revenue per dollar of new capital are decreasing.

Fig. 5.—New Capital and Business

In 1922 each dollar of new capital was accompanied by added sales amounting to more than 16 kw.-hr., but in 1927 for each dollar of new capital sales were only 9.2 kw.-hr.

Fig. 6.—Dilution in Some Cases

The kilowatt-hours sold per customer have not increased greatly, because of dilution and non-intensive selling.

Fig. 7.—Increase in Customers

The number of customers is increasing at the highest rate in the domestic class.

Industry Leaders Optimistic

Financial, public relations, commercial and engineering aspects of the electrical industry are discussed from the standpoints of the banker, utility executive, state executive, manufacturer and utility woman

AT LEAST once a year, in any activity, it pays to glean the past for policies that have justified their continuance and to envision the future in the attempt to determine how progress can be made on the soundest basis. This opportunity is afforded the electrical industry on a grand scale at the coming convention of the National Electric Light Association. In the following comments solicited from industry leaders the ELECTRICAL WORLD endeavors to put together a more condensed picture of needs and prospects. The dependence of prosperity is emphatically declared to rest on cordial customer relations and market analysis. How to obtain a greater use of energy per customer remains an outstanding problem, but one leader foresees an opening field for electrical applications. The trend toward investment trusts is considered, and elsewhere in this issue (page 1172) a leader urges scrutinizing investments but not overdiscounting the future. More evidence is brought to show the value of interconnection in the Southeast, where two billion dollars will be needed in the next thirteen years. The accomplishments of women in the light and power industry are briefly recorded.

Recommends Continuance of Progressive Policies

By R. F. PACK
President National Electric Light Association

THE electric business is not one of spectacular advances and setbacks. Its development has been obtained through steady year-by-year advances. If there is anything spectacular in its history, it is to be found by comparing the great industry of today with the infant of the early '80s.

The administrative year now coming to a close is no exception to the rule. We have progressed in every phase of the business of generating electric energy and distributing it to the public. Our engineers have devised means for obtaining a still further decrease in the average amount of coal necessary to generate a kilowatt-hour of energy, and have made additional progress in the art of carrying this energy to the customer.

There is every indication that our commercial departments have shown the public more and better ways for utilizing this silent servant in factory, store and home. There was a period when commercial activities were rather subordinated to problems considered to be of greater magnitude, such as development of superpower, standardization of accounting and establishment of basically sound public relations.

The industry became conscious of this condition some time ago and the result was a general awakening to a realization that commercial endeavor must be made and retained as a major function. More effective sales methods were adopted. As a result many municipal plants have discontinued operation in favor of electric

R. F. Pack

light and power company service. The same is true of a considerable number of isolated industrial plants. Railroad electrification is awaiting only a more favorable financial condition for the roads. Particularly gratifying progress is being made in developing the use of electricity in the home.

A census some time ago showed that the average American home was using only 30 kw.-hr. a month. Many cities now report that it is quite common to find residence customers of moderate means who are using in excess of 300 kw.-hr. a month. I hesitate to predict that this will ever be attained as an average, but there is no reason why the average figure shown by the last census should not be trebled or quadrupled in the next few years.

Excellent progress has been made toward the extension of electric service to the farm. I think figures now being compiled will show a big increase in the number of farm customers connected during the last few years. More important still, both new and old farm customers are being brought to an appreciation of the manifold possibilities of electricity in agriculture. Instead of limiting the use of electricity to lighting, as was often the case in the past, the farmer has brought himself to regard his farm as a factory where electricity may profitably be employed as a motive power, as has been done in the city factories.

The result of our public relations activities never can be put down in figures. The cultivation of cordial relations with our customers is too intangible a thing to reckon in either figures or words. Perhaps the best evidence of our success in this field is the fact that most of our state legislatures met during the past winter and a scrutiny of their activities reveals no indication of a general sentiment toward any other form of ownership and operation of the power companies. This is due neither to oversight nor to accident. Rather it is a tribute to the intelligence of the public, which, I think, realizes that under the present form of ownership and operation, accompanied by widespread distribution of securities, the electric light and power companies of this nation are generating and distributing approximately as much energy as all the rest of the civilized world combined. Our public

is too sensible to exchange such a plan of operation for any vague scheme of things in operation in some foreign land.

It is for us to continue our development under the sane and progressive policies that have proved themselves successful in the past, to strive to render an ever-increasing service to the public at the lowest possible cost and to make our every-day contacts with our customers mutually pleasant and agreeable.

Market Analysis Is Stabilizing Industry

By the Hon. J. H. TRUMBULL
Governor of Connecticut

THE increasing study of markets for electrical products by manufacturers and dealers tends to conserve capital, to keep operating costs within bounds and to adjust production to the purchasing power of the public. The replacement of hit-or-miss methods by systematic market surveys is an index of economic virility in the electrical industry, which leads all others in progressive development. Here facts are being substituted for uncertainties, and a better understanding is being gained of industry conditions through the work of the national trade organizations and through local co-operation. The days of isolated activity are largely past. Each year's experience increases the stability of the electrical industry, and there seems to be no other conclusion than that it is headed for a long period of sound development based on its unequaled willingness to adopt progressive ideas and methods and the almost unlimited possibilities of its markets.

Gov. J. H. Trumbull

Field for Electricity Opens as Labor and Power Costs Separate

By HENRY L. DOHERTY
President Henry L. Doherty & Company

IN MY early days in the electric business it seemed to me the greatest of our many opportunities was to increase our sales, and I soon learned that one central station was more or less powerless and only by combined efforts of the entire central-station industry could the more general application of electricity be brought about. In trying to arouse others to adopt intensive sales methods I naturally predicted the benefits we might expect, including the additional amount of energy we could sell. My estimates seemed so exaggerated to almost everybody that I gained the reputation of being visionary, and in all the succeeding years I have never succeeded in living down that reputation.

It turned out, however, that instead of being visionary I was a "piker" and the estimates which were considered so wild were far exceeded by our actual sales. I have learned by actual experience that a man is a fool for courage if he makes any prophecies that are not absolutely necessary. The most of my prophecies were made before the turn of the century, and while I was pointed to almost universally as the man having the most inflated ideas of the future of the electrical business and while my estimates proved radically wrong by being far too small, I was not so far off as those who criticised me, and in fact many who had called me a visionary man afterward regarded me as a man of vision. Having earned a reputation for vision, with some people at least, I shall not again risk my reputation by further prophecy by dealing again in concrete figures.

My position in the industry in those days was vastly different than it is today. There was not only room in the industry for a man of my type, but there was much that I could do for the industry. Today no other industry numbers so many skilled workmen and so many brilliant minds. I sit back, as it were, knowing that the problems of the industry have an army of highly trained men to solve them.

We must also remember one outstanding characteristic of the American people, and that is that a new innovation of today that may be considered a rank luxury will soon be thought of as an every-day necessity.

Perhaps none of us can actually foretell the future, but the relation between the price of human labor and the cost of electric power has become so far out of line that we can afford to use electric power in a brutally wasteful manner if it means a saving of human labor. There is no work done by man, woman or child that cannot be done electrically, or at least electricity can assist in doing the work or can contribute to the comfort of the worker.

H. L. Doherty

I could preach a sermon on what has been done in the electrical business if I had never been a part of the industry, but I fear that some people might think that I would be attempting, at least in part, to eulogize myself. We shall have to leave the sermon to those on the outside, but we can always remember that in pushing our own business and widening its applications, while we may be prompted in our work solely by personal glory or profit, nevertheless we are benefiting mankind in general.

Superpower, Industry and Agriculture

By C. C. CHESNEY
President American Institute of Electrical Engineers

A SUPERPOWER system — that is, an interconnection of existing and prospective generating and distributing systems—is the salient feature of the art of generating and distributing electric power at the present time. The broad idea of a superpower system must and will continue to grow more and more, because it is economically sound. It

brings about an improvement in the load factor of the generating system; it allows the metropolitan markets for power to be connected in a continuous system with remote power reserves, and makes the exchange of energy from one part of such a system to another a practical, reliable and an every-day occurrence.

Many are the engineering problems involved in the safe operation and satisfactory service of an interconnected system. However, electrical engineers have already solved

C. C. Chesney

these problems or are well advanced in their solution. For instance, spreading of the troubles of one system to the next system, the bugbear of the past, is prevented by proper relaying and sectionalizing. The holding of the proper voltage at different points and the prevention of the flow of wattless current are accomplished by adjusting, automatically if necessary, the ratio of the transformers so that the voltages at the point of connection may be of the same value and of the same phase.

The interconnection of electrical systems constitutes also an important progress in civilization because it aims to allow electrical energy, like the sunlight, to become available everywhere. The great advantages to be derived from the use of electricity in agriculture can hardly be foreseen, but we may reasonably expect that the economy of the farm, through its aid, will be broadly improved, at least to a point at which it may be compared favorably in efficiency with the factory and the workshop.

As science gives more thought to the food supply it may be expected that organized scientific research may become as important a function of agriculture as it has become of industry; and the community of thought, the unity of purpose, thus aroused, should bring the interests of these two great producing classes of the world more closely in harmony.

Public Relations Are Encouraging in New England

By CHARLES L. EDGAR
President the Edison Electric Illuminating Company of Boston

THE electric light and power companies of New England have passed through a winter marked by unusual legislative activity and by considerable political agitation. Through all these vicissitudes, however, the utilities have maintained their customary attitude of cooperative friendliness to the public, to its representatives and to their customers. Once again it has been demonstrated that the companies have nothing to conceal and that they seek only fair treatment and the opportunity to develop their service to the public along sound economic lines. Evidences are not lacking that the work of many years in striving for excellent public relations is bearing fruit. Security values reflect confidence in the future of New England utilities, and existing friendly relations between the companies and their publics bid fair to grow even stronger as popular understanding of our industry increases. Time is required to build up complete understanding among the individuals en-

C. L. Edgar

gaged in business relations, and patient service and the practice of good will in the central-station field cannot fail to win their just rewards.

Make Public Good Will the Outstanding Objective

By W. E. CREED
President Pacific Gas & Electric Company, San Francisco, Cal.

EVERY year the industry should have an outstanding policy. This year it should be to win further public good will through public understanding of the industry.

We have come through years of feverish building and construction in which we have given our time and

W. E. Creed

attention in large degree to physical things. We have built so fast to meet the demands upon us that our works have outrun public comprehension. Indeed, there are those within our own ranks who themselves have difficulty in keeping posted on our development.

In this situation it is not surprising that political quacks and others who thrive on unrest should seize upon our growth as justification for attack. They take advantage of our close application to the business of supplying the public with light and power to bewilder the people, not with assaults upon our service but upon the magnitude of the operations necessary to meet the public demands.

Our duty in the circumstances is to see that the people do not go uninformed, that they are not misled or deceived. We must work to acquaint them with the good we have done; with the improved service that size and interconnection have made possible; with the contribution we have made to manufacturers and agriculture; with the comforts we have brought to home and farm; with the enviable position we have given the country in point of electric supply.

We must make the measure and ex-

tent of regulation and public control better understood.

We must more fully inform the people of the widespread ownership of our securities.

Our duty is to tell our story fully, clearly and forcibly, so that the man in the street may be as familiar with our work as we are ourselves.

Utility Investment Trusts Growing in Favor

By BOWEN TUFTS
Vice-President C. D. Parker & Company, Inc., and Massachusetts Utilities Investment Trust, Boston, Mass., and Past-President New England Division, N.E.L.A.

PRESENT holders of public utility securities have two things to sell: First, the present value of their holdings, and second, their future value. By selling securities today they part with both, but by exchanging them on a sound basis for shares of a high-grade investment trust they are permitted to separate present values, as represented to some extent by the preferred shares of the trust, and future values, as represented to some extent by the common shares of the trust.

Where the preferred shares of such a trust pay dividends equal to the present income received by security holders who make this exchange, a security holder who exchanges will lose no income which he now receives, and the common shares will permit him to participate in any growth that may occur, either in earnings or in value.

Bowen Tufts

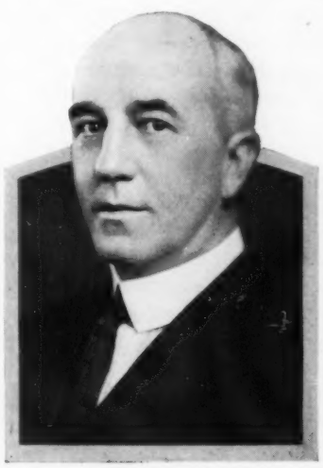
Careful study of the history and earnings of many companies and consideration of present and probable developments in the industry show that there is an increasing field of usefulness for the utility investment trust.

Many security holders realize that they would experience difficulty in reinvesting their funds as safely and with as sure prospects of profits as they now have if they should sell present holdings, and so the investment trust form of pooling security issues is rapidly growing in favor. In a transition period like the present, the stabilization of control accompanying the formation and administration of such trusts is a great advantage to the subsidiary companies, to the investor and to the public.

See Yourself Through the Public's Eye

By P. S. ARKWRIGHT
President Georgia Power Company, Atlanta, Ga.

TO ESTABLISH and maintain the good will of the public, first of all the public utility must deserve this good will. It must render good



P. S. Arkwright

service. It must establish in the public mind a feeling of absolute confidence in the company. There is no set formula as to how public relations work should be conducted. It is certain, however, that executives of the company must be able to put themselves in the position of the customer and understand and be able to feel the benefits and likewise the annoyances of the service.

Cover the territory reasonably. Serve the public as adequately as possible, and cheerfully. Tell the public all about what you are doing and trying to do. Then we should get good results.

Problems and Responsibilities of Electric Utilities

By H. T. SANDS
Vice-President National Electric Light Association

H. T. Sands

PUBLIC relations, merchandising, building of load and financing of future developments are the present outstanding matters of interest to the rank and file of our industry. Other factors entering into the continued development of the industry and the maintenance of existing efficient standards are not being overlooked, of course, but temporarily at least they are secondary in importance to those I have mentioned.

The realization is general in the industry that successful merchandising, load building and financing depend upon the giving of high-grade, efficient service—service to the public and also to the investor. Not only must we provide electric service adequate to the consumers' needs but we must also so administer our properties as to pay a fair wage to the investor for the money with which he is supplying us in order to make possible this service.

We occupy a dual position. We are, on the one hand, public servants, and, on the other, we are trustees for those who have invested their money in the electric light and power companies. This dual position involves a dual responsibility. Unless we adequately discharge our obligation to the investor we cannot long continue to secure the capital needed, any more than we can expect to build our load and merchandise our appliances unless we give proper electric service to the consumer. No step can be taken in which either of these duties is forgotten.

Prosperity and the Electric Utilities

By COL. LEONARD P. AYRES
Vice-President Cleveland Trust Company

CERTAIN economic conditions are at work in business and industry which favor the continued growth and prosperity of electric light and power companies. There is no doubt that the country as a whole is enjoying an era of exceptional prosperity which has lasted with only brief interruptions since the latter part of 1922. It is probable that this prosperity will remain at a high level during the remainder of 1927, but that business competition will continue to be so keen that

Col. L. P. Ayres

many business men engaged in trade, industry and agriculture will find it difficult to believe that the prevailing prosperity they read about exists.

It is becoming apparent that protracted prosperity during a period of declining commodity prices produces the keenest kind of business competition. It means that supplies of goods tend to be a little greater than the active demand for them, so that sellers are finding themselves constantly compelled to make price concessions and buyers are continually demanding better terms.

The result of this economic situation will be that the only producers who can operate at a profit are those who can so increase the efficiency of their manufacturing processes as to reduce operating costs about as rapidly as the price levels of these commodities decline. Those who cannot do so are encountering difficulties. Business profits will probably be large in the aggregate, and they will tend to go mainly to the firms that operate so efficiently that they can undersell their competitors, or that produce goods which are distinctively more attractive than the average, or that have arranged by mergers or agreements to avoid the extremes of competition.

But now it is also beginning to be apparent that many manufacturers have reached, or are reaching, the limits of their ability to reduce their costs of production. The competition that has come with this period of protracted prosperity and declining prices is a long-distance race in which the short-winded participants are being left behind. The evidence is to be found in the records of commercial insolvencies.

Despite the fact that failures are increasing in number, they are largely suspensions of smaller firms. In the security markets the shares of the leading corporations in many if not most important branches of business have made notable price advances during the past year, but the quotations for the shares of some hundreds of smaller companies are lower than they were at the beginning of 1926. This is a time of prosperity for the efficient and strong, for those that are successful in reducing their costs of production and that are not handicapped by inadequacy of capital. Some weeding out or dilution of profits will undoubtedly occur among the organizations which possess the opposite characteristics.

These economic conditions are greatly benefiting the electric utilities. These companies sell services instead of goods. The activity of general business increases the demands for power, and in the case of most utilities these exceptional demands do not result in bringing new competitors into the field. Furthermore, these companies are virtually assured of continuing prosperity in that the rates charged for their services are fixed by the commerce and public service commissions to produce an adequate, or fair, return upon their investments.

Indications point to the probability that there will not in the near future be important changes in present interest rates or costs of money for new financing which would hamper the extensive construction programs of the electric light and power companies. The influences of the prevailing fundamental economic conditions greatly favor the utilities, and this is reflected in the buoyant action of their securities on the stock exchanges.

Value of Interconnection Proved in the Southeast

By E. A. YATES
Vice-President and General Manager Alabama Power Company, Birmingham, Ala.

INTERCONNECTION of the larger electric service companies in the seven Southeastern states differs from that in other sections of the country because it has been in existence for at least ten years and the usual claims made for the reduction of reserve generating facilities, economy of production expenses and increased reliability of service, both as regards to short-time outages and to deficient capacity during periods of extreme low river flows, have been

E. A. Yates

tested and proved. A saving in operating expenses on the order of $1,000,000 per year has been made in one case.

These companies know that by virtue of interconnection the construction of additional generating plants can be delayed until sufficient load has been secured to utilize quite fully the initial installation as soon as it is completed. The loss during the so-called loading period is therefore reduced if not entirely eliminated. From an operating standpoint the wisdom and, in fact, the practical necessity of placing the responsibility for load dispatching under one individual have been demonstrated. The necessity to discontinue or curtail service to thousands of residential customers and many thousands of horsepower of industrial load has been avoided during the occurrence of extreme drought.

Claims made in behalf of interconnection have been tested in these Southeastern states and experience has shown that it works.

$2,000,000,000 Needed in Next Thirteen Years

By THOMAS W. MARTIN
President Southeastern Power & Light Company, Birmingham, Ala.

THE demand for power in the South is outstripping the average demand for the nation, as is evidenced by the fact that the increase in power output in 1926 in the Carolinas, Georgia, Alabama, Mississippi,

T. W. Martin

Louisiana, Tennessee, Kentucky, Florida and Arkansas was 18 per cent over 1925, as against 11.4 per cent for the nation. The output of the 3,000,000 hp. installed capacity —2,000,000 hp. hydro and 1,000,000 hp. steam—was 7,000,000,000 kw.-hr. in 1926, compared with 5,900,000,000 kw.-hr. in 1925. These figures give a real indication of business conditions in the South.

To meet immediate requirements hydro-electric plants aggregating 500,000 hp. and steam plants aggregating 100,000 hp. are now under construction and applications pending before the Federal Power Commission include an additional 1,000,000 hp.

Forecasts of power requirements by the power companies of the South indicate that the output in the ten states mentioned will increase to 21,000,000,000 kw.-hr. in 1940. This is about 30 per cent of the power produced in the nation in 1926. Expressed in another way, the increased demands for electricity in these states thirteen years hence will require 6,000,000 hp. additional, an average of 450,000 hp. for each year, or a total of 9,500,000 hp. in 1940.

Such a program of construction will require additional capital in the power companies involved of $150,000,000 per year, or, for the coming thirteen years, about $2,000,000,000. Additional capital required in the growth of cities and towns and in industries utilizing this power will not be less than four times that invested by the utilities, or about $8,000,000,000. Thus these states will require a total of $10,000,000,000, a sum equal to the Liberty bonds now outstanding, to meet the probable expansion in power facilities and in civic and industrial growth in that period.

The South is the coming industrial section of America. This is so because the South is the nation's last industrial frontier and opportunities before us are limited only by our vision. Seeing these visions is the problem of the South. This section of the country is in a position to profit by the economic mistakes of other sections, and with the development and distribution of power, the former theory of moving the individual to the power is completely changed. We have unlimited resources to be developed; and no more important question is before the people of the South than the continuance of the policy of fair treatment that has enabled her power to be developed to the point it now is.

Industry's Future Depends on Customer Relations

By ALBERT W. HARRIS
Chairman of the Board, Harris Trust and Savings Bank, Chicago, Ill.

ONE of the important factors contributing to the impressive growth of public utilities in the last generation and upon which the future of the industry will largely depend is the good will of the public.

A. W. Harris

Public utility men generally, and their bankers, recognize the importance of satisfactory public relations, resulting in reasonable regulation on the part of governmental bodies, a high credit standing in the large financial markets and a distribution of securities in the territory served. Cultivation of good will is one of the problems that the industry is studying constantly and is solving with a large measure of success.

What Utility Women Have Been Doing

By SOPHIA MALICKI
Chairman Women's Committee, Public Relations Section, National Electric Light Association

THE chief interest of the women's committee of the N.E.L.A. this year was a universal education of utility women in uses and presentation of appliances and establishing acquaintances with women's groups.

Sophia Malicki

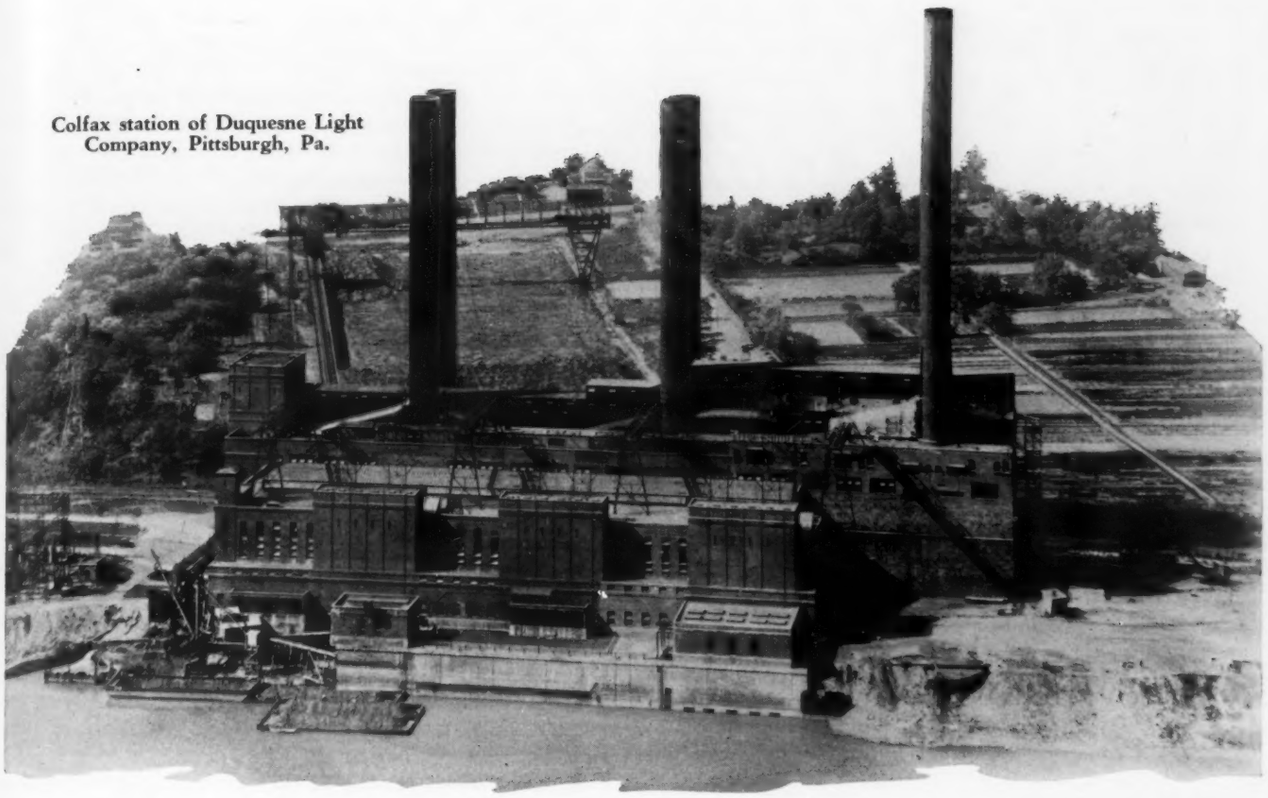
The first aim was covered by the program of educational meetings supported by the short course in electrical equipment given by the Iowa State College. The second aim was fairly started by a close working with the General Federation of Women's Clubs in its campaign of follow up of the survey; by establishing acquaintance with local women's clubs and women's magazines which have published accounts of the committee's work and of material prepared by it; through the short course stimulating other colleges to plans for including electricity in their home economics courses; and by co-ordinating home service work into a national activity as a division of the women's committee.

N.E.L.A. National Officers

and Members at Large

1. H. T. Sands, Vice-President
2. M. S. Sloan, Vice-President
3. P. S. Arkwright, Vice-President
4. John B. Miller, Vice-President
5. R. F. Pack, President
6. P. S. Young, Treasurer
7. Paul S. Clapp, Managing Director
8. A. Jackson Marshall, Secretary

9. J. E. Davidson,
10. H. C. Abell
11. George E. Cullinan
12. I. E. Moultrop
13. Gerard Swope
14. Joseph A. Fowler
15. H. M. Edwards
16. Edwin Gruhl
17. E. M. Herr
18. C. L. Collens
19. E. W. Lloyd
20. Harry Reid



Colfax station of Duquesne Light Company, Pittsburgh, Pa.

Principles of

Group Utility Management

By Halford Erickson

Vice-President in Charge of Operation
Byllesby Engineering & Management Corporation

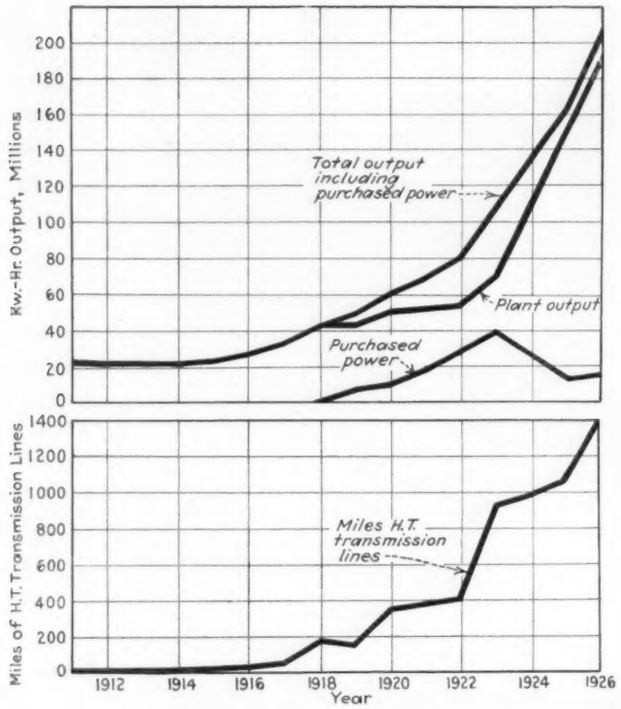
Their applications in the Byllesby group. Details of economies in all phases of management and operation made possible through centralized control. Study of a specific case

DURING the past few years, and particularly during the last two years, there has been a constant shifting of ownership in the public utility field, with a decided tendency toward the consolidation of smaller individual properties into larger and stronger operating groups. At the same time a certain amount of transferring or trading of local properties between these larger groups has been accomplished for the purpose of strengthening the local properties, developing more natural operating units and thus affording the one or the other operator an opportunity to develop a certain geographical area with the maximum of economy.

All of these transactions and transfers have aroused the interest of the general public in a certain measure as well as the interest of the investing public, and there is evident at times some misunderstanding of the natural economic laws upon which these transactions must be grounded if they are to endure. This article has been prepared to illustrate this economic background with definite data and to demonstrate the actual working out of general principles which have been stated in the past with some degree of generalization, although the principal factors are fairly well understood in the utility field.

In order to deal with facts and principles concretely, an attempt will be made to show the means and methods used by the Byllesby organization in making the operating economies theoretically inherent in group management effective upon the books of the local properties managed.

The group management of the Byllesby properties centers at the main office in Chicago. The bulk of the entire staff of the Byllesby Engineering & Management Corporation, numbering about 480 employees, is located at the main office. The general offices of Stand-



System and operating conditions in a specific case, illustrating effect of centralized management. (See page 1135)

ard Gas & Electric Company, in which is vested the ownership of many of the securities of the local properties, and H. M. Byllesby & Company, which is engaged as a bond and investment house in the marketing of securities, are also housed with the management corporation.

The local properties under the management of the Byllesby Engineering & Management Corporation comprise quite an extensive list, the gross earnings of which are annually in excess of $140,000,000, thus affording to the managers the opportunity to exercise the principles of group management in full degree. That is, the larger group of properties permits the maximum utilization of the staff of the managers and permits the permanent employment on its staff of a greatly diversified list of specialists in utility management. The local properties in any given geographical section are ordinarily incorporated into a single company which renders all the various classes of service within that area, although conditions existing prior to acquisition cause some variation from this rule.

Broadly speaking, the duties and services of the management corporation may be classified under three main functions, viz:

1. Financial and fiscal agents.
2. Engineering and construction.
3. Operation.

As financial and fiscal agent of the local properties, the management corporation secures the capital necessary for expansion or for refunding operations and handles a multitude of lesser operations, more routine in nature, in connection with the financial structure, which relieves the local property almost entirely of duties pertaining to capitalization.

As engineer and construction manager, the management corporation designs all major extensions of plant and facilities and supervises their construction through resident construction engineers assigned thereto.

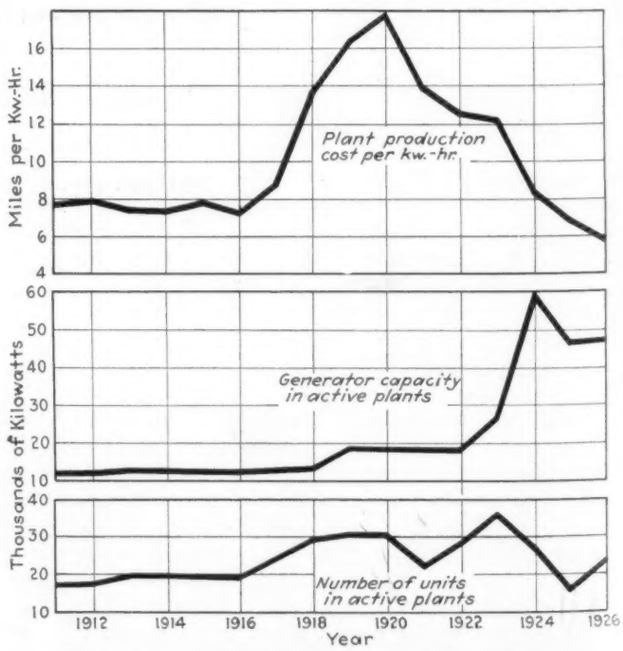
As operating manager, the management corporation decides matters of policy, directs and supervises operation and in general maintains close contact for the guidance of all departments of the local property.

All of these functions are interrelated in large degree and are very properly combined under a single management which can assume undivided responsibility for proper financing, proper engineering and proper operation, to the ultimate end that good service be rendered at low cost. These functions and duties will be related in greater detail in succeeding paragraphs of this article.

Financial and Fiscal Agents

WHILE holding and management companies, through their various organizations, render valuable service to the public in many different ways, it is more than probable that no other part of these services is more important from a public point of view than that which is rendered in a financial way and which consists of assisting the utilities associated with them in obtaining the capital required for new extensions, improvements and refunding operations. This subject is so important from the viewpoint of all concerned that it warrants somewhat lengthy discussion as an economic factor, responsible in large degree for the evolution of the present holding company system.

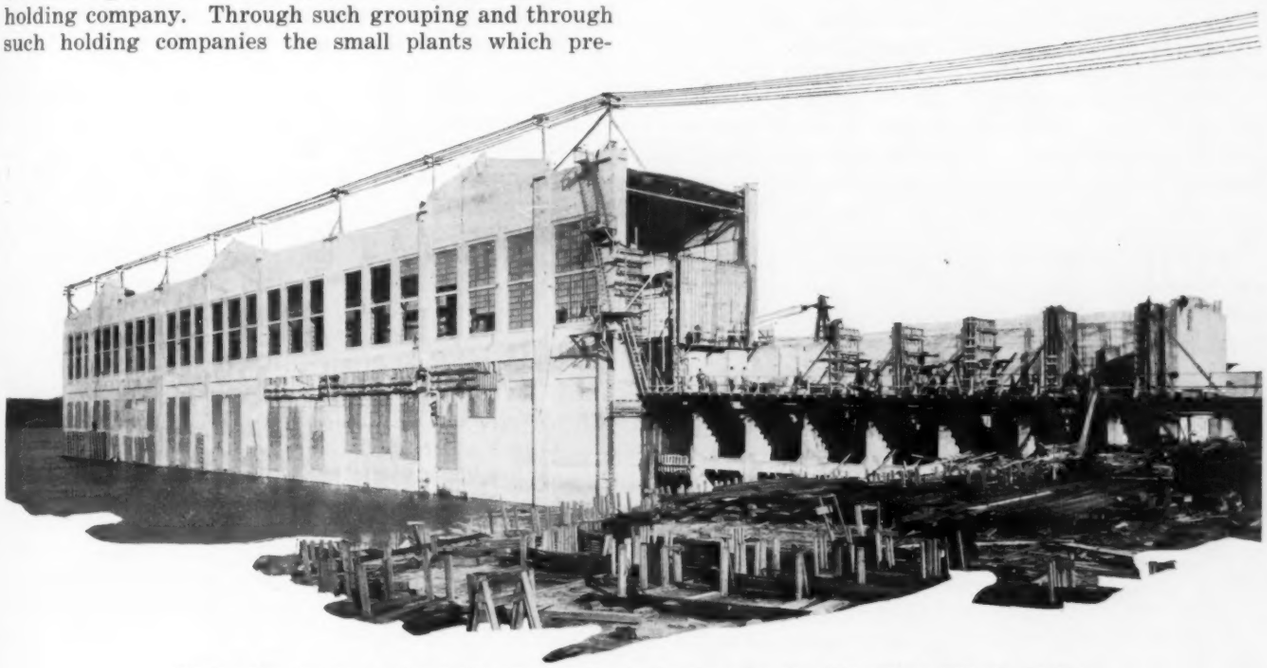
To obtain all the capital needed for utility development is no easy task. The smaller utilities serving small communities, operated independently without holding company connection, find it very difficult to obtain even a small part of the capital they need. Not only this, but up to within the past few years even utilities of considerable size, such, for instance, as those whose property and business are worth as much as a few hundred thousand dollars, have also found it difficult to obtain such capital on favorable terms. The utilities operating in the larger cities have been somewhat better situated in this respect, although there have



Production cost reduction and increased capacity of active plants

been times when they also have had to pay very high prices for their capital.

The smaller utilities serving small communities which thus find it difficult, if not impossible, to obtain all the capital required for adequate service as long as they remain independent are not only numerous but they also serve large masses of people in the aggregate. The population they serve is as dependent for its comfort and well being upon good utility service as are the people in the larger cities. The difficulties encountered by the small plants in securing all the capital needed for good plants and efficient operation, together with the gradual discovery that this unsatisfactory condition could best be relieved by associating several small plants with some of the larger ones into a larger group on a somewhat co-operative basis, under one management and control, are largely responsible for the creation and growth of the modern utility investment or holding company. Through such grouping and through such holding companies the small plants which previously could not obtain the capital they needed, at least on acceptable terms, have been placed in about as good a condition as that which obtains for the larger plants serving the larger communities. The result of all this is that small towns which formerly had at best only poor and part-day service are furnished with as good utility service under holding company management as that which obtains in the larger cities and at nearly, if not quite, as low rates.



Hydro-electric plant of Louisville Gas & Electric Company on the Ohio River (March, 1927)

It is, in fact, largely through the stabilizing effect and improvement in conditions that have been brought about through the holding company that the credit situation of the utility industry, as a whole, has gradually grown stronger. It is not so very long since even the best situated utilities found it difficult to obtain needed capital on terms which they could afford to accept. There were, of course, reasons for this.

The capital required by them for adequate service is so great that when compared with the annual earnings it led many to question whether the utilities could continue to earn fair returns on all of this capital. The earnings of the utilities were also so restricted by state and local regulation and by public opinion that the returns earned on the investment therein have, on the average, been much smaller than in most other industries. These and other conditions have tended to discourage rather than encourage the flow of capital into the public utility field. The utilities have often been forced to appeal for capital on the ground of the stability of their business rather than on the returns they can earn, and this argument has by no means always been effective.

The cost of the capital used becomes a part of the cost of the service to the customer along with the cost of the labor employed, the cost of the material used up and the cost of all other elements that enter into the service. When the expense of producing the service is high, the rate charged must be higher than when the cost of the service is low. As the cost of the capital is one of the largest single factors that enters into the cost of the service, it is manifestly very important to the public that the capital needed be obtained on favorable terms.

Public utilities are in constant need of new capital for extensions to their plants and for improvements, as well as for refunding and other purposes. The total investment in a utility and its business usually amounts to from about four and one-half to about seven or more times as much as its annual gross earnings and averages fully five times as much as these gross earnings. The annual demand alone for such capital often amounts to as much as 50 per cent or more of the annual gross earnings, and in the long run often averages considerably more than one-third as much as these earnings. For the smaller utilities the investment required in proportion to the gross earnings is, as a rule, considerably greater than is the case for the larger plants.

The amount of capital required by public utilities is not only large but, as is the case for practically all business undertakings, it has to be largely obtained from the sale of their bonds, notes and stocks to large and small investors in all parts of the country. The securities thus issued by the utilities for this purpose are, for the most part, first sold to investment banking

and bond houses, which in turn sell them to investors of all classes through their own agencies and connections. This is now the cheapest and best method of raising capital.

SECURING FAVORABLE MONEY RATES

To obtain the required amounts of capital on favorable terms it is necessary that the securities upon which it is had should be well protected by property and earnings; that the plants back of the securities should be well maintained and efficiently operated; that there should be good reasons for believing that these conditions will continue in the future; that, if the utilities serve a small community, they should be under the control of a holding company; that the public relations of the utilities should be good and that all reasonable efforts should be made to maintain and improve such relations.

When these conditions are not present, the securities issued are usually regarded as very risky. Risk is an important element of the price which must be paid for capital for the very good and universally recognized reason that risks will not be assumed unless compensation is paid therefor. It is also well understood that bankers will not even handle, or investors take, securities which, besides being very risky, also have a restricted market.

It is not surprising that securities issued by the smaller utilities that stand alone or that are not associated with any larger group or holding company should be regarded as very risky and that it should be found practically impossible to obtain necessary capital thereon. Such small plants are not often in position to furnish adequate service and at the same time earn reasonable returns or a living wage. Their business is too small to enable them to maintain efficient plants and competent business organizations and to avail themselves of the trained and technical assistance that is needed for efficient operation. Their plants are often out of date, inadequate and poorly maintained; their business too much restricted to take advantage of the savings that accrue from large-scale operations; and as long as they stand alone they must pay higher prices for their capital, for their material and supplies and for practically everything else that is needed in the service. Even the brokerage expense or cost of marketing whatever securities they can sell is about twice as high as for the larger issues or companies.

It is because of such facts and conditions as those just outlined that bankers and investors look upon the securities of the small independent plant as too risky and too costly to take and hold. Such securities are not generally traded in anywhere or quoted in the general markets. Even if the bonds of such plants, amounting to less than about half of the capital required, are occasionally taken by local investors, there is as a rule no market whatever for the stock which comes on top of such bonds and on which about half of the capital must usually be raised. This alone is fatal. No utility can long exist that is not able to raise at least one-third of the capital it needs on stocks which come after the bonds and notes. In fact, the adequacy of the service rendered and the financial standing of the utility depend very largely upon whether it can raise capital on its stock.

The uncertain and unsatisfactory conditions just outlined are, as a rule, soon changed for the better when control of such independent utilities as those in question is acquired by holding and management corporations such as the Byllesby unit. In common with others, this company is organized for the purpose of promoting, developing and operating public utilities. To that end it has provided the necessary financial and operating organizations. It is able to secure, on attractive terms, all the capital that is needed by all of the plants associated with it. It is also seeing to it that these plants are efficiently operated and well kept up; that the service they render is adequate, and that their business is also extended as much as possible. That all this should result in greatly improving the situation for the utilities involved, especially the smaller ones, is not difficult to understand.

The holding and management company has in fact combined in one effective and flexible business organization all the resources and all other advantages of all kinds of all the utilities controlled by it, as well as those of its own. Through such a combination as this the importance of these resources and advantages are greatly increased. The combination enhances the credit of the combined group to much greater figures than those which represented the sum of the credits of all the individual plants while standing alone. Owing to the flexibility of the organization of the holding company, these resources and credits can also be promptly used where most needed among the individual plants. Each plant in the group can in fact be said to have behind it the resources of all.

An organization so comprehensive in its scope as this can hardly fail to be effective. To the utilities embraced in the group it increases the available supply of capital and reduces its cost. It leads to better designed, better maintained and more fully extended plants, furnishing service that has rapidly improved in quality and volume. All of this means increasing gross earnings obtained at decreasing expenses per unit, growing returns on the investment, and rates permitting greater development of the market. It also means greater safety or diminishing risks to those who furnish the capital needed by purchasing its securities.

ABLE TO FLOAT MOST DESIRABLE FORM OF SECURITIES

The increase in the supply of capital is enhanced by the fact that under the holding and management company organization those methods of financing are permitted which are best suited to the particular situation that has to be met. For instance, if it is not advisable to issue or sell bonds, debentures and stocks may be resorted to. If it is not best to market either at the time, they can be used as collateral behind short-term notes, which are usually readily taken by bankers and held until more permanent financing becomes advisable. Such notes can usually be placed on favorable terms. In all this the resources and credit of the holding company itself always play most important parts.

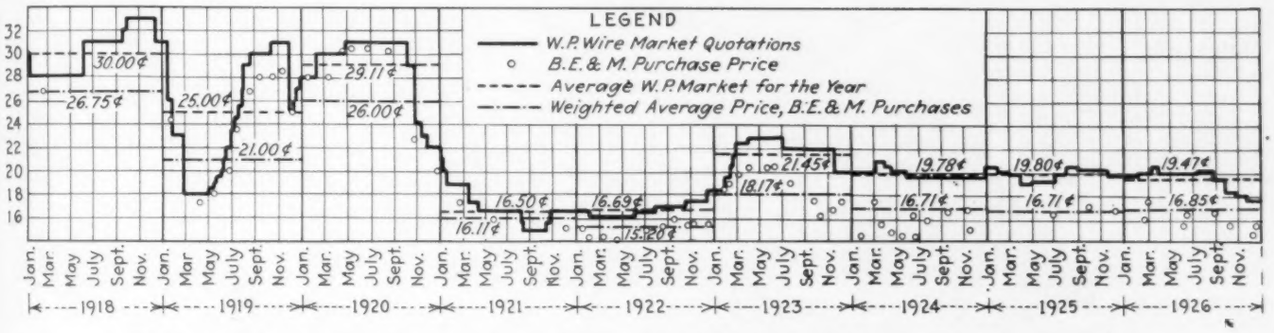
The enhanced credit of the holding company itself, which results from the consolidation, is in turn accompanied by improvements in credit of each of the individual plants. When funds are needed, each local plant in the group is usually able to borrow in its local banks much greater sums than they could ever have obtained while standing alone. The small utility thus finds its position strengthened both at home and abroad.

In addition to its other advantages, the holding company, acting for the group, is also doing business on a

sufficiently large scale to have competent organizations of its own for the marketing of its own securities as well as those of other companies. It is also connected with other banks and bond houses in the financial centers that are engaged in similar work. The result of all this is that the holding and management company can market the securities of its group of plants much more quickly and at much less cost than would be possible without such selling organization and connection.

It is very clear that such financial co-operation as that which is brought about through the investment or holding company is of enormous importance to all concerned. To the public or customer it means more and better service at lower rates than the small and ordinary sized utility would otherwise have been in position to furnish. To the utilities themselves it means better plants, greater volumes of business done at lower and decreasing costs and consequently improving returns.

While the savings to the public from the holding company control and operation are great, it is far from



Fluctuations of weatherproof wire market and average price of Byllesby purchases. This chart shows that buying averaged below the average market price

easy to determine definitely their exact amount. What, for instance, is the money value of the good and low-priced service which the holding company, through its large central-station power plants and through its extensive transmission systems, furnishes to hundreds of small communities throughout the country which would otherwise have no service at all or at best poor and costly evening service only? That this value is great will not be disputed. While it may not be possible to assign a money value to the comforts and conveniences which such service brings to numerous communities and great numbers of people, both directly and indirectly, it is certain that in a social and economic sense its importance is tremendous. Without such service no community could today either grow or prosper. Without such service, further, neither safe nor tolerably good living conditions can be generally provided in any city or village.

What, again, do the savings in fixed charges amount to which arise from the fact that, under the co-operative plans of the investment or holding company, capital can be obtained at much less cost than the price at which it could be had by each isolated plant or in any other known way? This question, unlike the one preceding it, can be quite fully answered.

Investment bankers, bondsmen, financial experts, economists, representatives of public utilities, are often testifying before courts, commissions and other bodies upon the cost of the capital obtained on different classes of securities for industrial and other purposes. Careful examination of such testimony and of the actual records in connection therewith discloses very clearly that these men in their testimony and other statements uniformly hold:

1. That the smaller independent plants probably cannot obtain all the capital they need on any terms which they can very well bear.

2. That such capital as they may be able to get will cost them about 2 per cent per year more in interest charges, discounts, etc., than the cost at which like plants can be furnished with all the capital they need after they become connected with a strong holding company or some other similar group or organization.

The testimony of such persons as those mentioned, together with other financial records, also makes it clear that, other things being equal, larger sums of capital can be had at lower cost than small sums. Investigations in point a short time ago disclosed that about 50 bond issues averaging not far from $4,400,000 per issue were sold on a basis that would net the investor about 6.10 per cent and that about 35 bond issues averaging about $475,000 were sold on a basis that would net the investor about 6.70 per cent.

In the brokerage or selling expense, the difference in cost as between large and small issues is relatively even greater than the one just given. When the ordinary brokerage expense, including the discounts, are added to the cost in the above two cases, it will be found that the difference is increased to more than 0.95 per cent. In other words, other things being equal, the cost of the capital obtained was about 1 per cent higher for smaller bond issues averaging a little less than $475,000 each than for larger bond issues averaging nearly $4,500,000 each. While the smaller issues were brought out by smaller utilities than those back of the larger ones, no utility is included that was not large enough to finance its needs on some basis when standing alone.

Where many utilities, large and small, are combined into one group under one control, and when the securities issued by this group, as a whole, are large enough to obtain the money needed by all of them, then it of necessity also follows that the average size of these issues is several times as great as would have been the case had the plants remained independent and had each of these plants had an issue of its own that was only large enough for its own needs. Through such grouping as this the small plants are placed in position to share in the savings accruing from large-scale financing.

Such differences as these in the cost of only one of

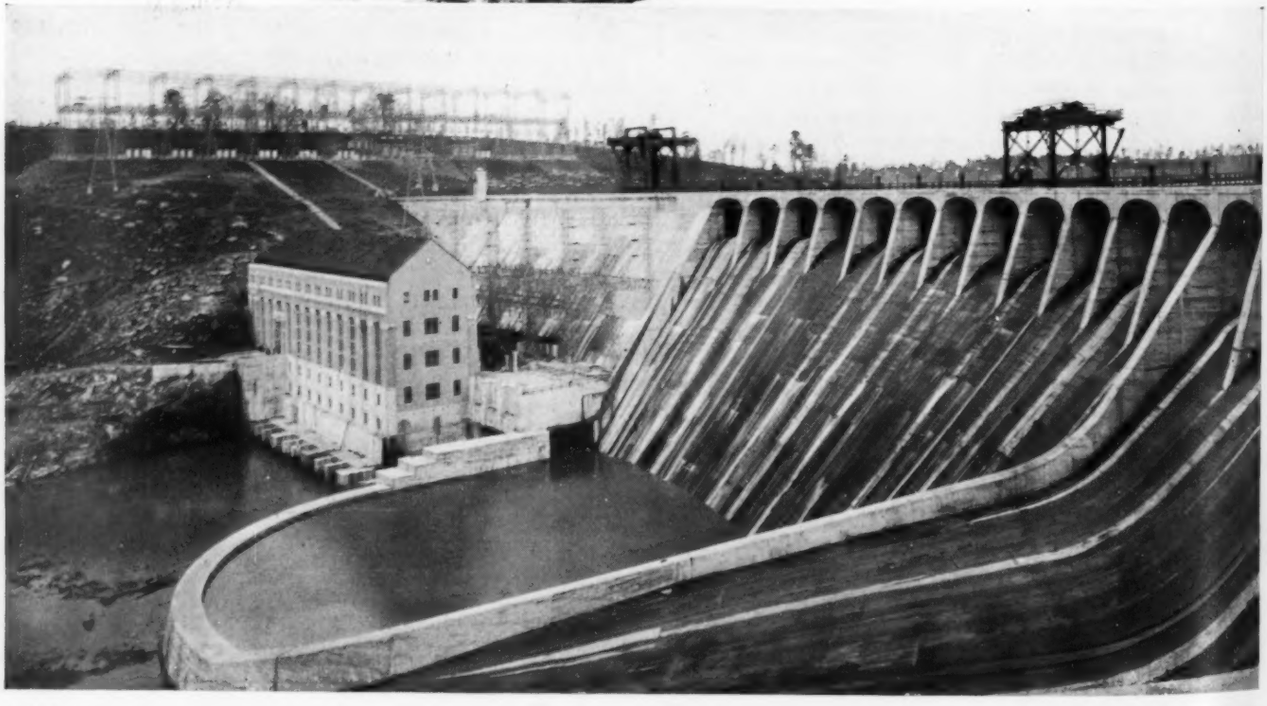
(Continued on page 1126)

At Lock 18 the Alabama Power Company is building a 144,000-hp. plant

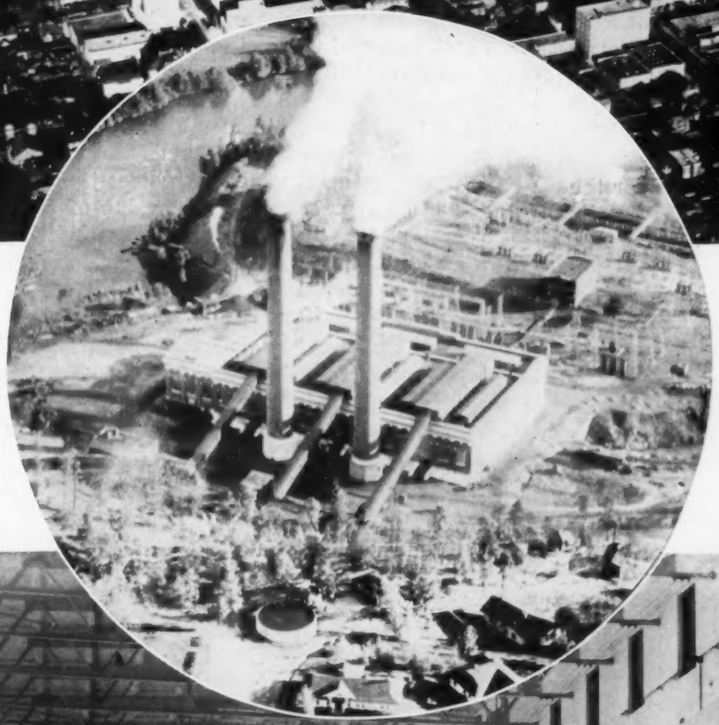
Alabama *is growing rapidly because of electric power*

Martin Dam is the latest hydro development of Alabama Power Company

Upper Tallassee plant, on the Tallapoosa River, is being reconstructed by Alabama Power Company to give 50,000 hp.

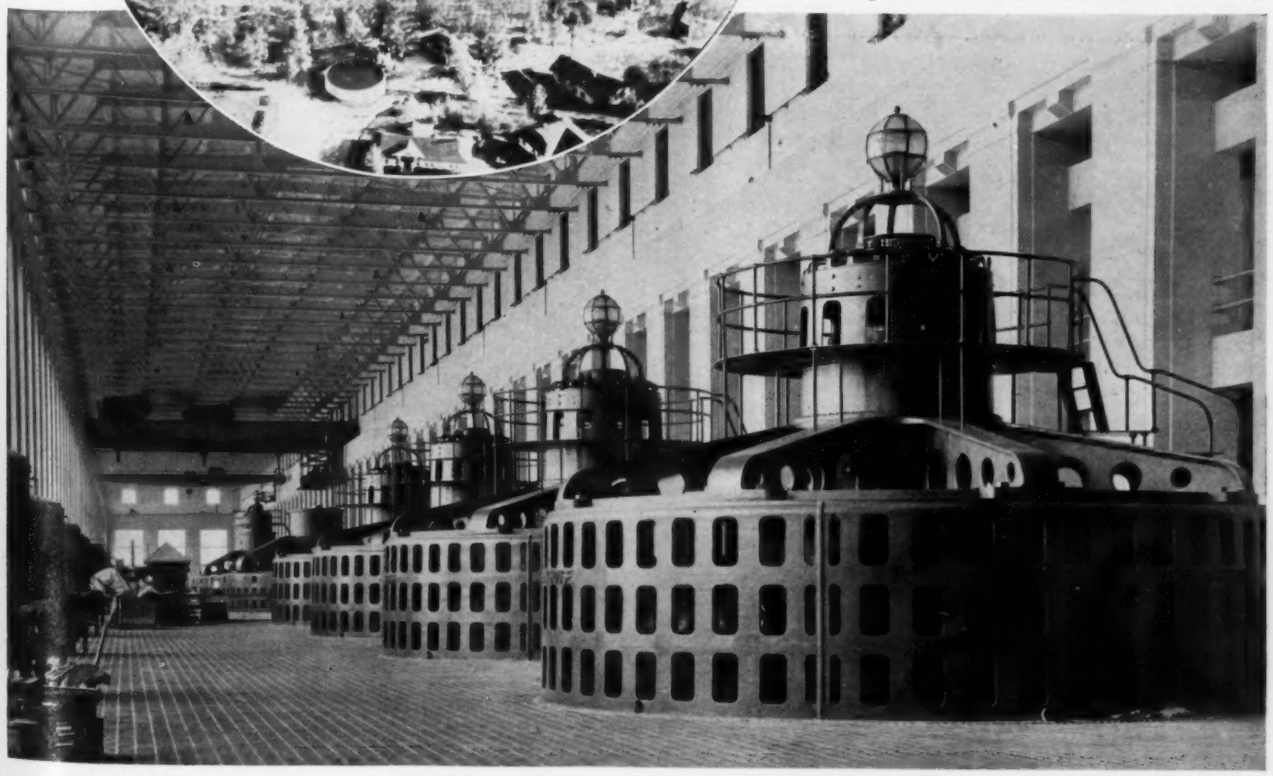


Birmingham is becoming a large load center



Gorgas plant of Alabama Power Company affords 83,333 kva. of steam power to supplement water power

A nest of turbines in Wilson Dam power house at Muscle Shoals



the factors can hardly help but be of enormous significance. This would be true even if it were much less than the figures given. Even if it amounted to 1 per cent only on all the capital to be raised, it would mean large sums each year.

The investment in public utilities, for instance, amounts on the average to about five times as much as their annual gross earnings. This means that a saving of 1 per cent annually on the investment is equal to 5 per cent on the gross earnings. It means, further, that on each $1,000,000 thus invested there is an annual saving of $10,000 in interest charges. This saving alone is much more than the annual charges which holding and management companies make for their services in consolidating the plants and for the responsibilities and work they assume in connection with operating the plants or managing the business. As this is only a part of the savings that ultimately accrue to the public or the customers from such consolidations and from such forms and management as those in question, it must be obvious to all that the holding and management company is at least earning its keep.

Other Work of the Management Corporation as Fiscal Agent

The creation of a strong financial structure under the foregoing principles does not end the duties of Byllesby Engineering & Management Corporation as financial and fiscal agent of the local properties. The finance department, in the Chicago office, relieves the local offices of much complicated and detailed work, and in other ways the managers render valuable assistance.

1. *Negotiation and Sale of Promissory Notes.*—Practically all utilities borrow money from time to time, either for temporary use in expansion of the property or for working capital. The management corporation arranges the flotation of promissory notes for the properties, and gives to them the benefit of a broader market and lower interest rates which it is able to secure in a competitive market. The volume of long-term financing handled by the managers influences to a degree the interest rate on promissory notes. Especially good terms are also secured from manufacturers in payments on major construction items where necessary.

2. *Indorsation of Promissory Paper.*—The indorsement of the managers is given promissory paper, and the resulting two-name indorsation furnishes further marketability and better interest rates. High-grade financial institutions charge from ½ to 1 per cent of face value for similar indorsement, which in this case the local property receives without special charge. More than $8,000,000 of such paper has been issued for one property in the Byllesby group, and this property has benefited to the extent of at least $40,000 during the past five years from the indorsement secured through its affiliation.

3. *Cash Deposits and Advances.*—The management corporation also provides the local properties with a means whereby excess funds may be deposited with it temporarily and earn current interest rates. On the other hand, it is sometimes found expedient by the local properties to borrow money from the managers rather than to issue promissory notes or other financing media, and such funds are available to them at current interest rates. This gives the equivalent effect of having an agreement with local banks to overdraw without formal negotiation and to earn on balances, both at normal interest rates. The same company, mentioned above, has been paid interest by the managers amounting to $108,000 in five years, probably less than 50 per cent of which could have been earned without the assistance of the managers.

4. *Transfer Agent, Etc.*—The managers relieve the local property of duties in connection with outstanding stock. They keep dividend records, disburse dividends and keep stock transfer and like records. All such work cannot be conveniently handled locally because of its occasional and periodic nature, but by handling all such work for the local properties the managers can arrange a better load factor basis and save money for the affiliated companies. Blanket insurance coverage on local security sales is arranged for also at a saving.

5. *Other Work as Fiscal Agents.*—The managers act as custodian of unissued and treasury securities and perform all duties regarding safe keeping, coupon clipping, etc., involved therewith. They prepare bonds for certification by the trustee, requiring painstaking care by a specially trained force; they deposit bond interest with the trustee and, incidentally, have arranged on newer issues to deposit such funds for the account of the company rather than the trustee, thus recovering such sums as represent the face value of coupons not presented, and they take care of all detail with reference to preparation of income tax certificates, ownership affidavits, etc., in connection with the normal 2 per cent income tax withheld at the source.

All of these further duties of financial and fiscal nature save considerable amounts for the affiliated companies. In the case of the property mentioned in this section, the aggregate amount is estimated in the neighborhood of $25,000 per year, including those heretofore mentioned. Depending upon the size of the property in question and the particular circumstances effective there, the management corporation confidently expects to save the local properties amounts ranging to as much as 0.2 or 0.3 per cent of gross earnings annually.

Engineering and Construction

THE value of the physical property of the combined Byllesby utility interests is at present in excess of $900,000,000 and the construction expenditures during the past three years have averaged approximately $40,000,000 per year. The construction budget for the current year is in excess of $60,000,000. The size of the combined properties, with the resultant large annual construction requirements, necessitates an extensive and capable central engineering staff if it is to meet fully all of the consulting, designing and construction requirements of the various properties.

The engineering department is, in effect, a consulting and construction engineering organization, available to each of the properties at all times. It is under the direction of the vice-president in charge of engineering, whose staff consists of a chief engineer, various specialists in charge of the electrical, mechanical, hydroelectric and other divisions, and a large corps of assistants, draftsmen, etc., located in the Chicago office. In addition to this force, the department maintains a branch office in Pittsburgh and a number of construc-

tion superintendents continually engaged in the supervision of projects at the properties of the subsidiary companies.

The larger subsidiaries maintain permanent local construction forces, which perform routine construction and replacement work under the general supervision and in accordance with the design or standard specifications of the central organization. All major projects, however, are handled directly by the Chicago office of the organization.

Space will not permit a detailed discussion of the many activities coming within the scope of the central engineering department, but the following outline will indicate briefly the more important of these duties:

1. Investigation of Necessity for Improvements and Extensions:
   (a) Study of development of business and forecast of future requirements.
   (b) Increasing economy of operation.
2. Preliminary Studies and Plans:
   (a) Co-ordinating construction with operation.
   (b) Fitting engineering requirements to financial or economic situations.
3. Preparation of Estimates and Specifications:
   (a) Preliminary estimates for budgets.
   (b) Final detailed estimates and specifications following authorization.
   (c) Collaboration with purchasing department in buying of equipment and materials.
4. Supervision of Construction:
   (a) Major projects handled directly through department's construction superintendents.
   (b) Supervision of local forces on routine construction.
   (c) Continual contact by designers and engineering executives during construction.
5. Establishment of Uniform Construction Standards and Methods.
6. Engineering Advice in Connection with Operation.
7. Assistance in Emergencies.

Consideration of the above outline shows conclusively that the services rendered to the local properties are far more comprehensive than could be secured from an independent consulting engineering firm, assuming that the property could afford to retain the services of such a firm, which is not true in many cases and impractical in all cases except in connection with major projects. Briefly, the engineering department of the management corporation makes available to the smallest village in the system engineering service and construction standards equivalent to the best that might be secured by the largest metropolitan utility. At the risk of some repetition, there are summed up below the principal advantages afforded by the management corporation's engineering service, which could not be, or at least are not usually, secured by the average independent company:

1. First-class construction, with resulting annual savings in maintenance and replacement, better and more reliable service and increased safety in operation.
2. Authoritative engineering advice on current operations and future development.
3. Proper balance maintained between engineering and economic requirements of the individual property.
4. Cost of this service below average charges made by independent engineering organizations.
5. Contractors' profit, architects' fees, etc., amounting to at least 10 per cent of construction cost, entirely eliminated.
6. The primary interest of the engineering department is in the continuous, satisfactory, economical operation of their installations, rather than merely the successful completion of construction work on an individual project.

Operation of Properties

THE operating department of the management corporation exercises continuous control and supervision over every phase of operation of the subsidiary companies and also serves to co-ordinate the financial and engineering services with operating requirements. Following are the principal operating functions as they are carried out in the central organization:

1. Operating efficiency.
2. Purchasing.
3. Insurance.
4. Valuation.
5. Rates and contracts.
6. Advertising.
7. Merchandise sales.
8. Accounting.

The operating force on each of the individual properties is similar to that usually found on independent properties, with the important exception that the personnel need be sufficient only to carry out routine work in accordance with the policies and methods prescribed by the central operating and engineering organization.

All of the actual operation of the local properties is in direct charge of the vice-president in charge of operation of the management corporation. The executives in charge of the divisions indicated above constitute what might be termed the operating committee, reporting to this vice-president. All general questions of operation or policy receive the collective attention of this committee, while subjects relating to a particular division are handled by the executive in charge. The methods pursued by the respective divisions in applying the principles of group management to their respective functions are as follows:

Operating Efficiency.—The engineers in this division specialize on the operation of electric generating stations, gas plants, transmission systems, distribution systems and general operating methods. They have their headquarters in Chicago, but spend a large part of their time traveling over and inspecting the subsidiary properties. They are at the service of each local operating force for the purpose of assisting in the solution of the various problems that may arise and they also take the initiative in checking up on local operating practices and remedying undesirable conditions. They report back to the other divisions recommendations for changes or improvements of a special nature where this is necessary and in turn make full use of facilities of the other divisions and are free to call upon them for assistance at any time. Their familiarity with the operating details and methods of the various properties permits them to place rapidly in effect on all properties those practices which have been tried out and perfected in individual cases.

As an illustration of what may be done over a period of years by means of this constant attention to details, supported by a consistent and far-sighted development policy, we have made an analysis of the electric power

development on one of our larger subsidiaries. When this property was first acquired by the Byllesby interests, it consisted of half a dozen isolated communities of medium size. Today it consists of a modern connected system covering the major portion of an important state and serving nearly 150 communities of all sizes, most of which previously had no electric service whatever or were forced to be content with mediocre and limited-hour service. Most of this development has occurred during the period when capital was difficult to obtain even by the strongest utilities and was almost prohibitive in cost to a small utility in the district in question.

In 1911 the properties of this subsidiary were served with power from four segregated plants containing three gas engines and fourteen steam engines, having a total generating capacity of 11,850 kw., the largest unit being a 2,000-kw. cross-compound heavy-duty steam engine. The combined output for 1911 was 22,113,396 kw.-hr., and since there were no high-tension transmission lines connecting these communities, each plant supplied the requirements of its individual territory. This necessitated duplicate or spare generating equipment in each plant and resulted in the low average plant factor of 21.3 per cent, as well as the inability to load economically the most efficient units.

Economies in Purchasing

	Total Net Purchases	Per Cent Saving on Net Purchases
Distribution transformers	$790,310	11.1
Watt-hour meters	376,203	13.2
Switching equipment	936,335	17.6
Motors	38,597	8.6
Incandescent material	82,896	13.7
Lamps	374,498	19.7
Total	$2,598,839	15.0

In the following years, by connecting newly acquired territory and existing power plants with transmission lines, many small, unreliable and uneconomical plants were shut down, except possibly for peak-load requirements. This eliminated duplicate equipment and plant organizations, provided more economical loading of existing equipment, permitted the installation of larger and more efficient units and provided the numerous and scattered communities with reliable service such as can be obtained only from large power systems through their interconnected plants.

The accompanying charts show that, due to this expansion program, the system kilowatt-hour output in fifteen years increased 836 per cent; that, due mainly to transmission line interconnection, the kilowatt-hour output from active plants increased 767 per cent, with an increase of only 296 per cent in active generating capacity; that only about one-third of the units on the system were normally operated because of their more reliable and efficient condition; the plant factor increased from 21.3 per cent to 46.6 per cent; the largest generating unit in 1911 was a 2,000-kw., cross-compound steam engine, whereas in 1926 the largest was a 15,000-kw. turbo-generator.

During 1911 the production cost per kilowatt-hour on the busbar was $0.0076, whereas in 1926 this cost was $0.0057, in spite of the fact that during this fifteen-year period there had been a material increase in fuel cost, labor and supply costs. The production cost in 1911 was in fact far lower than is usually experienced in similar plants, due to extensive use of natural gas fuel, which was available during that period at extremely low rates. The curve of production cost clearly shows the effect on these costs during the war and the period of readjustment. The marked reduction in 1924 resulted from the completion of several transmission lines connecting two new highly efficient steam-turbine plants to the system, thereby reducing the quantity of purchased power made necessary in the preceding years by lack of economical generating capacity in the system.

Purchasing.—Three principal factors govern in the purchase of materials—namely, quality, delivery and price. Any one of these factors may be of sufficient importance at any time to dominate the two others completely. Too often in the case of smaller utilities with inadequate purchasing facilities or personnel the question of price is given controlling weight, and it has been one of the principal objects of the central purchasing department to develop adequate methods for properly balancing each of these considerations.

Quality and delivery being satisfactory, price should be the decisive factor in the placing of purchasing orders. The business offered by the combined Byllesby properties, which has averaged many million dollars per year and is constantly increasing, is very attractive to the manufacturer for three principal reasons:

1. The volume of business offered.

2. Specifications and engineering details for special apparatus are completely worked out by the corporation before submitting to the manufacturer, thus eliminating this preliminary expense on his part.

3. The high credit rating of the Byllesby Engineering & Management Corporation.

The details of just how savings in price are secured by the concentration of the purchasing of the combined Byllesby properties into a single central unit, together with the specific amount of these savings in various instances, may be roughly grouped in three divisions.

1. Commodities such as meters, transformers, lamps, etc., on which a fixed discount is given and applied as each purchase is made.

Discount is covered by a contract agreement guaranteeing a minimum annual business and available only under such conditions. The accompanying tabulation shows the principal commodities bought in this manner, the total amount of such purchases in 1926, and the percentage of net saving under the blanket contracts compared with the cost of these commodities to the average independent utility.

Weatherproof Wire Purchases

Year	Bare, Lb.	Weatherproof, Lb.	Total, Lb
1918	.....	.....	800,000
1919	.....	.....	3,535,123
1920	764,421	546,166	1,310,587
1921	1,107,187	2,496,750	3,603,937
1922	4,276,454	1,758,850	6,035,304
1923	3,377,435	4,036,724	7,414,159
1924	3,630,964	2,971,423	6,602,387
1925	2,034,000	3,815,800	5,849,800
1926	3,797,000	4,068,500	8,665,500

2. Commodities of special nature and design, such as power plant equipment, where each order involves more or less of an engineering problem and considerable design work is necessary on the part of the manufacturer properly to meet the needs of the consumer.

It is impossible, except in occasional instances, to

obtain a direct comparison of the cost of such apparatus under different conditions, inasmuch as this apparatus is all of a special nature. We have, however, statements from a number of representative manufacturers giving their reasons for quoting more favorable prices on this type of equipment to our central purchasing department than it would be possible for them to quote individual companies. Space will not permit quoting from these statements, but they indicate in general that the prices obtained on this type of equipment by our central purchasing department are at least 10 per cent lower than could be obtained by any of our subsidiary properties standing alone. Their reasons may be summarized as follows:

(a) Saving in sales expense, due to concentration of purchasing in Chicago, at which point practically all manufacturers maintain sales headquarters.

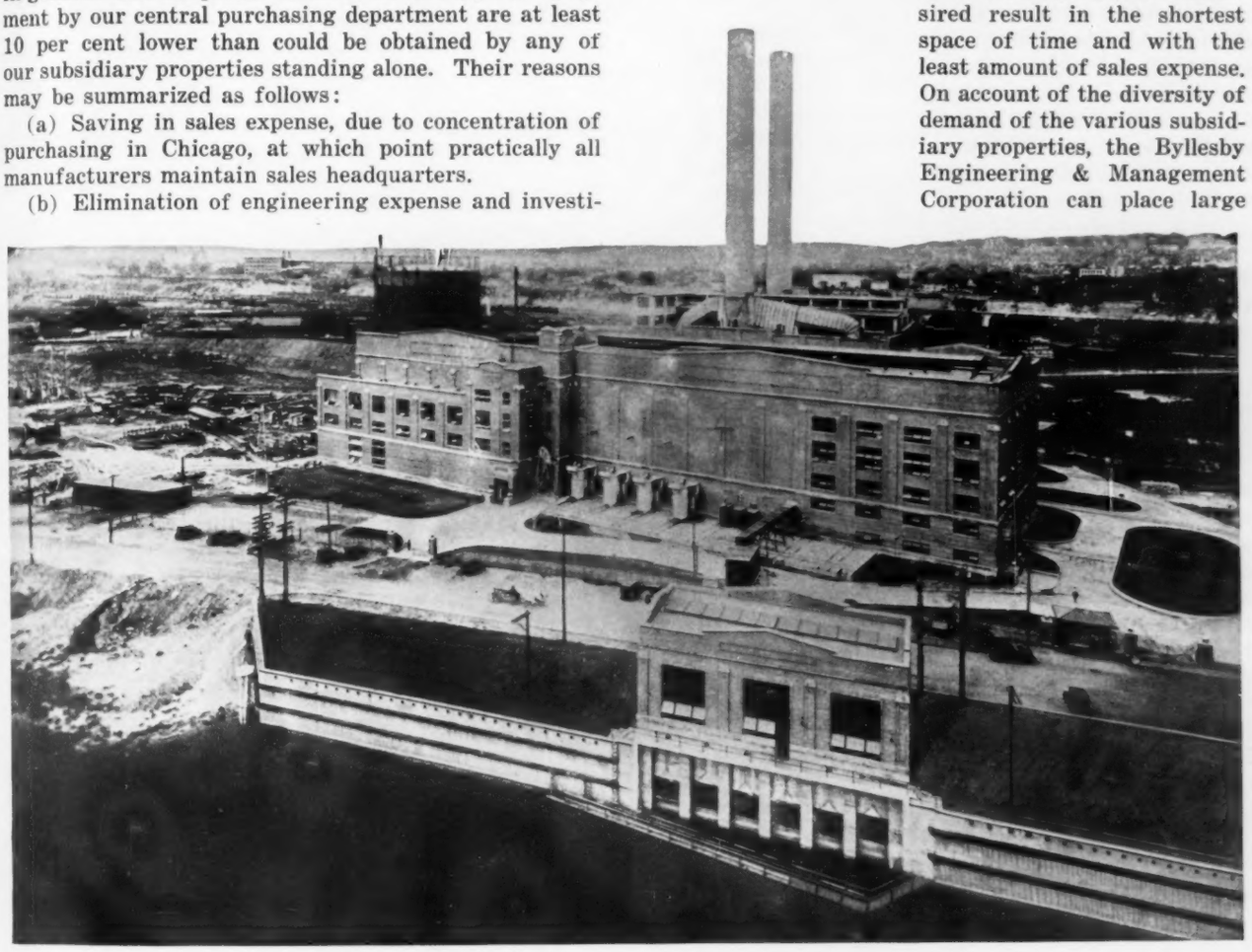
(b) Elimination of engineering expense and investigation because of the fact that our central department is fully capable of drawing exact specifications for all necessary equipment of special nature and is willing to take the responsibility that the equipment specified will meet requirements.

(c) The size of the orders placed, together with the fact that the central organization is continually in the market and able to take advantage immediately of favorable buying conditions.

(d) The high credit rating of the Byllesby company.

3. Commodities of a basic nature sold on standard specifications of the general trade.

On such commodities the manufacturer's profit depends on turnover and volume of business. Such profits are very close and the commodities are often sold at cost or less to attractive accounts in order to insure the necessary volume of business for the year and keep the manufacturers' organizations operating on the most economical basis. A specific example of this type of purchasing is given in the accompanying chart, covering copper wire. Part of the saving shown is due to direct lowering of cost by reason of the volume of business offered. Part is due to the proper anticipating of market fluctuations and taking instant advantage of favorable buying situations. During a slump in business the manufacturer of this type of material turns first to his largest customers when he desires to cut regular prices in order to increase volume of production. He thus achieves the desired result in the shortest space of time and with the least amount of sales expense. On account of the diversity of demand of the various subsidiary properties, the Byllesby Engineering & Management Corporation can place large orders on which the manufacture begins at once and is spread over a period extending from six months to a year.



High Bridge station of Northern States Power Company, St. Paul, Minn.

The amount of coal purchased by the combined properties is in the neighborhood of 800,000 tons per annum. The central purchasing department has been able, on account of this buying power alone, to negotiate coal contracts on a basis substantially below the market. Furthermore, the strategic location of the various properties has stimulated competition among the several producing areas for this business, with resultant lowering of price. Numerous opportunities have occurred whereby the purchasing department could take immediate advantage of temporary market conditions and purchase large quantities of fuel below even the lowest contract figures.

Investigation covering several years' purchases indicates that the saving effected has varied from 20 cents to 50 cents per ton below the market, a fair average being about 35 cents per ton on the total purchases.

This in itself represents a net saving of $280,000 per year.

The advantages of management corporation purchasing affect the entire volume of purchased material used every year by the properties in construction work or in operation. This holds true as well for the purchases made by the local properties. Their purchases are subject to competitive bidding, which is always influenced by the fact that if the prices are not right, the purchase will be arranged for through other channels. It is not difficult to see that a tremendous saving can be made in the aggregate where local properties are annually expending a total of $25,000,000 or more in materials and supplies.

A final advantage of group management closely related to the purchasing of materials is the unusual facilities afforded for disposal of surplus material. For instance, on one of our subsidiary properties an unexpected change in the plans of the highway commission necessitated a complete change in the design of about twenty miles of transmission lines. Because of this change the property had approximately $10,000 worth of new material on its hands, which could not be used on its own system. This material was immediately disposed of to another subsidiary at the market price at an expense to the first company of approximately 5 per cent. If this company had been forced to salvage through the ordinary channels of trade, it is doubtful if it could have realized more than 50 per cent of its real value.

Insurance.—Ordinarily the placing of various types of insurance is considered a strictly individual or local matter. However, the handling of this business on a large scale has become more and more desirable during recent years, and at the present time the centralized control of insurance matters by the management corporation is not only giving far better service to the individual properties but is resulting in material savings in annual premiums. The insurance department of the Byllesby Engineering & Management Corporation, by reason of its close co-operation with other departments, is always in close touch with the condition of the various properties and is therefore able properly to determine insurance needs of such properties and to take advantage of improvements for the purpose of securing reduced rates. By reason of the volume of business which this central department places with insurance companies it is able to secure the co-operation of such companies in securing the best results for each individual property, and also by reason of this large volume of business prompt settlement in the event of loss is absolutely guaranteed and the probability of purely technical defences by the insurers is eliminated.

In addition to this superior service and security the central department is able to secure substantial savings in premiums by reason of the combining of risks under blanket contracts. Under the rules of insurance organizations in many states, risks of a given magnitude which have been insured for a minimum period may qualify for an experience rating. Furthermore, if the corporation insures properties in a number of states under one management, it is permissible to average the experience of several states, from which aggregate of experience a certain percentage, either credit or debit, from the tariff rate may be established. The single management of an insurance department of a management corporation qualifies under this classification, and it is therefore permissible to rate all of the subsidiary companies together as one risk in most of the states in which they are located. By reason of this procedure certain discounts have been allowed and published by the various state rating bureaus applicable to workmen's compensation and to liability insurance rates. Taking one of our large subsidiaries as an example, the following results were obtained during the years 1922 to 1925 inclusive:

Amount of Total Premiums

	Based on Local Experience	Actual Amount Based on Combined Experience	Saving by Combined Rating
Workmen's compensation insurance	$325,913	$177,284	$148,629
Public liability insurance	277,575	164,246	113,329
Total	$603,488	$341,530	$261,958

This is a saving of 76 per cent on this item alone. In addition to this reduction, average savings aggregating $10,000 per year have been effected in the combined cost of fire, automobile and other minor classes of insurance carried by this subsidiary.

Valuation.—Public utility properties are periodically faced with the necessity for having appraisals of their physical property prepared not only for use in rate proceedings but for financial and other purposes. This is a highly specialized service, particularly when it also involves the presentation of cases before courts and commissions, and the personnel rendering it not only must be technically able but must continually keep abreast of current regulatory practices and decisions.

The average utility property does not have enough demand for this type of service to maintain an expert valuation staff, and usually calls upon independent specialists of this type only when such service is needed. However, with its large group of subsidiary companies, the management corporation finds it necessary and highly economical to maintain a valuation department the services of which are available to each of the subsidiaries when needed.

Such a staff, permanently employed, has the following advantages over the practice of employing outside firms:

1. Familiarity with the physical characteristics, operations and local conditions on each property.

2. Co-operation by local property in making available all necessary records, providing temporary personnel for detail inventory work, and office and transportation facilities.

3. Ability to secure active co-operation on the part of manufacturers and dealers in obtaining material and labor price data.

4. Benefit of advice and assistance by other divisions of central organization on technical questions, accounting, policy, etc.

That these advantages have actually produced considerable savings in the cost of performing valuation work is demonstrated in the following statistics covering the work of this division during the past three years:

	Property Appraised	Cost of Valuation Work
1924	$273,529,130	70,304
1925	609,804,251	91,527
1926	237,868,539	82,998
Total	$1,121,201,920	$244,829

Of the total property value appraised, approximately $250,000,000 represents detailed inventory and appraisal work of a nature satisfactory for rate proceedings, the balance being for financial and other purposes. The expense of performing this work, summarized above, includes not only salaries and expense of all regular employees, but salaries of temporary assistants in the field and other items allocated to this work.

In addition to this appraisal work, the valuation department performs many other services of special nature, requiring probably about one-third of its time, the cost of which is included above. The cost to the individual properties, if all of the above services were performed by outside consulting engineers, would be at least five times the actual cost to the management corporation as indicated.

Rate Advice and Statistical Service Essential to Progress

A department devoted to rates and statistics is maintained in the Chicago office having general supervision over all rate matters and rate investigations. This department has a personnel of men specifically trained for this work, thoroughly conversant with rate theory and regulatory commission practice, whose duty it is to supervise or actually to prepare the material used in rate cases; to examine, revise and finally approve all rates to be made effective in the local properties; to prepare or examine contracts relating to the purchase, interchange or sale of energy, and in general to oversee all matters relating to the rate structure. The department also prepares statistical analyses as a routine matter, summarizes pertinent data in comparative form for all properties, examines weekly and monthly reports from the local properties, reports upon operating forecasts and performs other like duties.

This department has always fostered the installation of promotional rates for electric lighting service and as a general rule all properties managed are well equipped in this respect for the intensive development of the domestic electric load. Rural rates have been under investigation for years and definite practices established. Gas house-heating rates have received approval as a means of balancing winter loads against summer loads. It has been the aim of the department to encourage load building through the rate structure with due regard to the cost of service. The manager of the department is at this time serving on National Electric Light Association and American Gas Association rate committees.

The rate department is not maintained primarily for use in rate litigation. The major part of its activities is devoted to everyday commercial and operating problems of the managed properties. The management corporation prefers to avoid extensive rate litigation and usually good service and harmonious public relations accomplish this end. Sometimes rate litigation cannot be avoided when it becomes necessary to establish the right to a living rate in the high courts. This corporation has acquired properties where practically the entire rate structure was in litigation at the time of acquisition. In one notable instance stipulations were made disposing of the entire matter previously in controversy. Such a course involves a sacrifice of gross and net earnings, but in the end proved to be the best manner in which amicable public relations, essential to continued growth and development, could be established.

Many properties when acquired have had effective a collection of rate schedules not productive of load building and not safely established upon the cost to serve. Such situations are standardized, as fast as conditions permit, with like classes of service having similar costs receiving the same rate treatment.

Work of this kind is particularly valuable to the local properties, since its equivalent cannot be secured from time to time in the open market. For major rate cases, competent rate specialists can be secured at high per diem charges, but such men are handicapped by the lack of a thorough understanding of local conditions. Nor are such men available from day to day to render assistance on the many problems involving rate practice constantly arising. Thus in the long run the management corporation can provide the best service through its staff, a service including a thorough understanding of local conditions, able and ready to render assistance by telegram, by correspondence or by personal visits to the properties.

The functions of advertising and publicity are recognized as necessary adjuncts to the successful operation of public utility companies. Direct benefits result by arousing interest in and creating a demand for electricity and gas and for the appliances which utilize these services. By setting forth facts and giving out correct information about the business, its plans and accomplishments, advertising aids in the establishment of satisfactory public relations. By promoting the sale of securities, both in the local territory and in the general investment market, advertising and publicity aid the public utility enterprise to finance constructions of new plants and additions and improvements to existing properties, all of which reacts with cumulative effect for the benefit of the territory served.

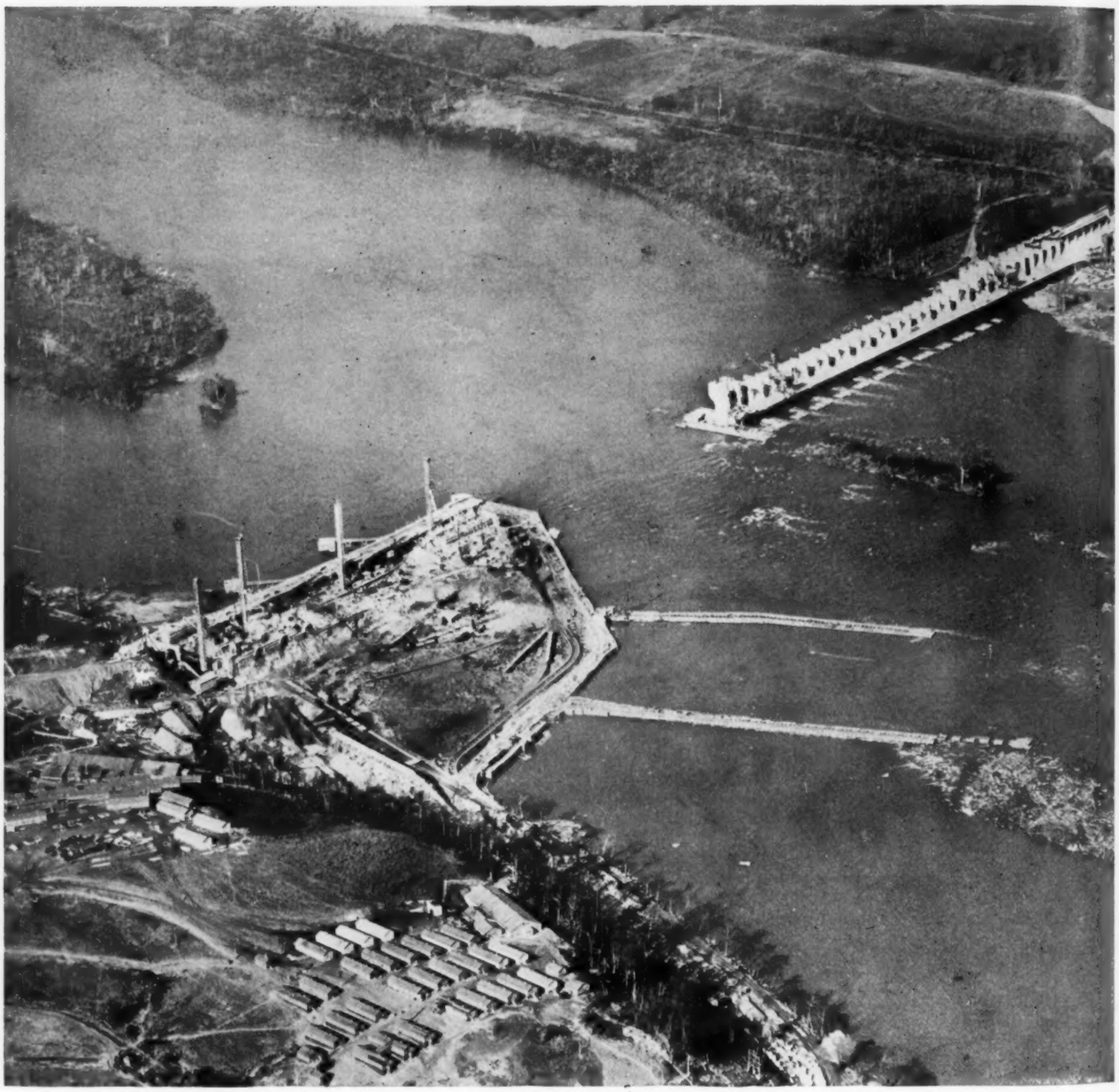
Specialists for Advertising and Publicity

Advertising and publicity in order to be effective must be prepared by specialists, who are at the same time fully aware of local conditions. The Byllesby Engineering & Management Corporation for seventeen years has maintained an advertising department, which, through close connection with advertising agencies of nation-wide repute, is enabled to enlist the services of additional specialists when required at a much lower cost than would be possible for an individual company. Through careful and thorough research and study, the association with other concerns engaged in the electrical and gas industries throughout the country, the advertising department keeps in touch with the latest developments in public utility advertising and passes on the knowledge so gained to the companies over whose advertising programs it exercises supervision.

The work of the advertising department includes specifically the making up of schedules and budgets and the preparation each month of a regular advertising service for use in newspapers and other publications in the territories served by the operated companies, except in cases where the operated companies are unusually large and require advertising staffs of their own. These latter work under the supervision of the headquarters advertising department. Close contact is maintained with the properties to determine just what type of advertising is best suited for their needs, and members of the advertising department frequently visit the local company headquarters to confer on the best means of supplying their advertising requirements.

In addition to advertising functions, the department carries on many other forms of publicity. In the Chi-

Conowingo *as it appears today*



THE site of this now famous hydro-electric plant is two miles below the town of Conowingo, Md. Work was started in March, 1926, and it is expected that the dam will be in operation in the fall of 1928. The first equipment of the plant will consist of seven generating units with an initial wheel capacity of 378,000 hp. The ultimate capacity will be 594,000 hp. The dam and power house will be in Maryland, but the upper half of the reservoir or pool, which will extend up the river for 14 miles, will be in Pennsylvania. Each of the seven generating units is to have a rating of 54,000 hp. The generators will be rated at 40,000 kva., 13,800 volts.

Power will be transmitted from Conowingo to Philadelphia by means of 220,000-volt, three-phase transmission lines, each capable of carrying the entire initial output of the plant. This installation will be tied in with the four big steam generating plants of the Philadelphia Electric Company and will mean a saving of the 750,000 tons of coal a year which would otherwise have to be burned in these steam plants to meet the demands of the system.

cago office of the management company a weekly bulletin is printed and distributed to newspapers and other publications throughout the country. This bulletin carries news about the operation of the subsidiary companies, including earnings, dividend declarations, new security issues, etc., their plans for construction of new properties and expansion of business, and is beneficial to the local properties by obtaining a wide distribution of news concerning them. A monthly magazine of eight pages is regularly sent out to a list of more than 40,000 investors. This publication, like the *News Bulletin*, carries complete, up-to-date information about the operated companies. The department also publishes a monthly magazine for Byllesby executives, known as *Byllesby Management*, by means of which exchange of ideas among the various properties comprising the Byllesby system is expedited.

Among the miscellaneous functions of the advertising department is consultation with operated properties and civic organizations regarding community advertising and publicity; the collection and preparation of information, articles and advertisements regarding public ownership, customer ownership, utility regulation, rates, franchises, etc., the formulation of definite advertising and publicity plans for the development of public relations policies, new business, merchandise sales, customer-ownership campaigns, etc.; attendance at conventions and other gatherings devoted to advancing various phases of public utility activities and financing, and the supplying of news and other information to editors, writers and research institutions.

Without the services of the advertising department of the management company it would be necessary for each of the operated properties to maintain an advertising department of its own or to maintain larger and more expensive staffs for this purpose than is the rule, and it is distinctly to their advantage to be able to draw upon the advertising department of the management company for the bulk of their advertising work. The dollars and cents value of this saving is difficult to estimate, but it easily runs into many thousands of dollars.

Merchandise Sales.—This division has complete charge of all merchandise sales activities carried on by the subsidiary properties. Members of this department investigate the various types and manufacturers of utility appliances, prescribe most suitable lines that should be handled by the individual properties, formulate all sales policies and directly supervise the installation of standard office fixtures, sales methods and, in general, control the entire merchandising business for the properties. This department works in close co-operation with other departments in order that this phase of the business may be productive of best results from the utility standpoint. The company's principal objectives in engaging in this merchandising business are, first, the building of residence and commercial loads and, second, making available proper service along these lines in communities where it cannot be properly handled by outside commercial interests. It is the general poilcy to stimulate and assist the activities of independent retailers of this merchandise rather than compete with them.

Accounting.—This department prescribes the form of accounting reports and records to be used by each of the associated utilities in conformity with regulations imposed by governmental agencies, and sees to it that the accounting records and forms so prescribed are adhered to in the work and in making up the report. The accounting and forms thus prescribed are up to date in every respect and so made up as to yield the best results for statistical and other purposes to the management company. The supervision necessary in order that this work may be carried on in a proper manner is exercised through regular audits as well as through daily, weekly, monthly and annual and other reports. These reports are carefully examined and compared with the preceding ones for like periods, and there are compiled therefrom operating and other statistics to be used in the work. These facts are carefully prepared and analyzed and are in turn laid before the executive officers to be used by them as a guide in their administrative work and in disciplining the work in all departments. The activities of the auditing department also extend to other fields, such as those created by our complicated taxation, industrial and financial systems, and there, as elsewhere, are of great value.

Centralized Accounting Enables Up-to-Minute Analyses

To prepare up-to-date systems of accounting, forms and records of all kinds requires thorough accounting and business knowledge and a comprehensive grasp of the business as a whole. To see to it that these records are properly kept requires constant checking through monthly and other reports and frequent audits of the records themselves. The importance of correct and up-to-date systems of accounting and records and of such other facts relating to the business that the necessary statistical and other reports can readily be prepared therefrom can hardly be overstated. They are absolutely necessary in order that the results of the business and the operations may be known and fully understood. They are equally necessary for comparative purposes and in order that material or facts may be obtained through which the operations can be examined, checked and disciplined.

Without such accounts and records dishonesty and mistakes cannot be detected and corrected; without them, further, the results for one period cannot be compared with the results for others; without such records it is also difficult, if not impossible, to detect slovenly work where it prevails and efficient work where this obtains and to find and apply proper and necessary remedies where such are needed. In short, without complete and correct accounting and statistical records, it is practically impossible to manage successfully any of the larger business enterprises. It is not too much to say that the greater proportion of such businesses are today largely managed and operated through statistics. The value of the work of the department that gathers and properly records the facts or raw material from which such statistics may be had is therefore great.

Such work, like most other work in the business world, can be carried at a relatively much lower cost on a large than on a smaller scale. The smaller utilities standing alone cannot afford to carry on such work on a sufficiently broad scale to make the results as complete as they must be in order to have the greatest value. The management company, on the other hand, is in a more advantageous position in this respect. It can do on a large scale for all the plants, whether small or large, at a small cost, all the work of this kind that the individual plants cannot afford to do for themselves. This it is also doing, and it is doing it in such a way

that every transaction is properly recorded, and that every fact that may be of value for statistical or other purposes is properly obtained and preserved.

It is very apparent that if a public utility corporation has the services of even the best obtainable auditor and assistants, it is about all they can do to conduct and supervise the accounting preparatory to the compilation of reports. It is almost impossible for them to keep in touch with the advance in auditing and accounting methods and at the same time be burdened with the demands made by the public, the bondholders and the stockholders of the corporation for the information to which they are entitled. This immediately brings forth the point that the local auditing and accounting force of the public utility corporation must be supplemented by a staff of supervising accountants. Even certified public accountants today have not in their employ or at their command the service which is necessary to supplement the local auditing and accounting force of the public utility corporation. This service must come from a firm specializing particularly in public utility auditing and accounting, such as that of the Byllesby Engneering & Management Corporation.

The auditing and accounting department of the Byllesby Engineering & Management Corporation is able without additional expense to the local company to compile and have at hand centrally, at least in its New York and Chicago offices, full and complete statistical, financial, operation and construction figures relating to all its subsidiary companies, so that these are available at a moment's notice, not only for any bondholder or stockholder of the local company but also for use which can be beneficial only to the subsidiary company. This class of service must be immediate and of a nature which will be understood by the inquiring public; that is, it must be comparable to similar statements of other utility corporations.

The burden of analyzing all of these inquiries is upon the central accounting department and means that there is no interruption to the work of the local subsidiary. It eliminates the necessity of letters, telegrams and even trips to financial centers, at which points the managers have their offices.

A point to be emphasized relating to the statistical, financial and other data supplied from the central office to the investing and interested public is the fact that it inspires confidence when coming from a management and engineering organization which is in daily contact, and generally acquainted, with the inquirers.

In the bond and stock circulars, advertisements, letters and bulletins to investors, etc., which are published from the central offices, the auditing and accounting department collects and analyzes statistics concerning the subsidiary, which must be strictly up to date and in conformity with the trend of current financial events.

The department furnishes all of the statistical information necessary for the preparation of applications for the issuance of bonds, notes or other securities of the subsidiary companies and also complies with the provisions of the trust agreements and indentures, securing the funded debt, relating to the furnishing periodically to the trustees of the required earnings statements. The local offices of the subsidiary companies are not bothered with these numerous requests.

The auditing and accounting department is composed of men expert particularly in the public utility field, of many years' experience, and, with possibly no exception, men who have devoted their entire lives to no other work than public utilities. The accounting staff is in direct personal touch with all the financial centers of the country, including wide and personal acquaintance with financial houses, financial publications, security commissions, certified public accounting firms, governmental income tax units, income tax experts, large security investors, trade organizations, all large public utility corporations, manufacturers of office appliances, devices, systems, etc. Practically all of the officers of the accounting staff are on committees of national reputation tending to the improvement of auditing and accounting of public utility corporations. It would not be possible, and the expense would be prohibitive, for the local auditor to attend these committee hearings, as the men selected for these positions are men who devote most of their time to following up this class of work. The accounting staff keeps in direct touch with all publications, periodicals, books, etc., relating to accounting and auditing methods, and these are carefully perused for any benefit which may result to the subsidiary company. In a word, the subsidiary company has at its command the best available accounting and auditing advice.

General Operations of Organization

THE administrative and supervisory functions of the operating committee previously referred to are perhaps of more importance in the carrying out of the principles of group management than any one of the separate divisions herein described. Proper co-ordination of these various activities in harmony with a general operating policy and the effective enforcement of this policy throughout the system are vitally necessary. The following paragraphs outline some of the duties of this committee and will illustrate this necessity.

1. Budget Control.—The committee prescribes the form and methods by which all construction budgets are prepared and reviews them in detail after they are submitted before approval. Proposed additions and improvements are first segregated into two classes—viz., necessary and desirable. Inclusion in the first classification may be due to service demands, municipal or state regulations, or safety requirements. Inclusion in the second group may result from public policy considerations, profitable returns from new business, or increased economy of operations. When the budgets have been revised to include only necessary or desirable items, they are approved by the committee and, subject to final approval by the directors, constitute the primary control over capital expenditures for the year. Improvement requisitions covering each item must, however, receive individual approval by the committee as the work progresses, and careful check is maintained throughout the year to determine the amounts expended and the over or under run of actual costs compared to budget estimates.

2. Public Relations.—Satisfactory public relations are considered so important that every phase of construction or operation that may conceivably affect such relations receives careful consideration by the committee. Many expenditures are authorized on this account which promise no immediate adequate return, and many operating practices have their origin in the desire to satisfy the public rather than from technical requirements.

3. Governmental Contact.—Operation of the combined properties involves contact with hundreds of municipal officials, more than a dozen state utility commissions, and even the federal government. The knowledge and experience gained from such wide and varied contact is a valuable guide in the proper handling of other controversies or negotiations.

4. Emergencies.—Accidents may at any time seriously affect the local property, and fire, flood or tornado may not only paralyze utility service but destroy whole communities. At such times the resources of the large organizations are most needed and appreciated. The central organization can and does immediately muster the necessary money and supplies for relief work and the men and materials from its own organization or neighboring properties to restore service.

Application of Management Practice to a Particular Property

IN THE foregoing paragraphs the principles underlying group management, the duties of the management corporation and the organization developed by Byllesby Engineering & Management Corporation to perform those duties have been summarized. The causes leading to holding or management company control of financing, the necessity for sound engineering design and economical construction and the requirement that the property be operated with low running and overhead costs are present in all properties managed.

The type of management afforded by this corporation or any other engaged in like occupation cannot exist unless it is built upon a firm foundation. This foundation must be that of good service at low cost. It must constitute an advantage to the local or affiliated company.

Therefore, in order to make clear that a properly organized and efficiently directed management corporation can be of benefit to the affiliated or managed properties, in order to stress the important facts already developed and in order to develop certain other facts having to do with the local property, these facts and principles will be applied in the form of a concrete illustration. Some of the figures used have been brought out heretofore, but are repeated in order to show more clearly the accumulated effect of management. In this illustration the cost of equivalent services or materials or the cost of a substitute organization will at times be used as the measure of benefit to the subsidiary, as this has heretofore been found to be the most logical basis of comparison of such facts.

Let us assume for purposes of illustration a fairly good-sized utility doing an annual gross business of $10,000,000, having a plant account of $50,000,000 and capitalized accordingly, serving the public with various classes of service such as electricity and gas.

Administrative Officers.—According to the policy of the Byllesby Engineering & Management Corporation, the managers assume the duty of furnishing much of the executive talent required by the subsidiary without cost to it other than the regular management fee.

In line with this policy, the vice-president and general manager of the property is assigned to the property as resident manager and his salary is paid by the management corporation. Other officers of the management corporation also serve as officers of the local property without pay, so that it usually happens that only the secretary or treasurer is paid by the local property.

The administrative talent necessary to operate a utility property successfully must be of high order. This is as true for utilities as it is for industrial management generally, where those in responsible charge have won and are maintaining their positions in the competitive struggle that in one form or another is prevailing everywhere. Any one at all familiar with utility operation knows that there are innumerable matters of policy, not only of an administrative nature but of technical significance as well, which must be determined quickly and correctly. The electric and gas industries are making tremendous progress in extending the scope of usefulness of their products, but much more can still be done. New means of improving system load factors are being evolved, proved and put into operation to the end that the cost of service may be reduced. Expansion programs involving engineering, financial and operating study are prepared, not only for the immediate future but for years in the future, in order that sufficient capacity to serve will be available where and when needed and in order to avoid that kind of piecemeal construction which eventually results in a physical property unsuited to its then purpose and uneconomical in operation.

Agreements covering interchange of electric power with bordering companies are being developed in order to reduce the reserve capacity required of each and to effect other operating economies. In the field of gas operation cheaper manufacturing processes must replace obsolescent equipment and all available and reliable sources of natural gas supply must be canvassed. Service must be made available to new classes of users, such as rural customers. Investment in relation to gross and net earnings must be carefully watched. Security markets must be found and enlarged as the utility grows.

By reason of their wider general experience with a number of properties, officers of management corporations are usually better equipped to handle all of these problems, particularly with respect to the smaller properties, which exist in far greater numbers than do the larger independent utilities.

This being true, it is a corollary that the replacement of such executive talent by a complete local staff will be an extremely expensive operation. A utility of the size mentioned would be obliged to go into the open market for a president, vice-president and general manager, second vice-president in charge of engineering, secretary, treasurer and an assistant general manager. The president is, of course, in general charge of the company, responsible to the board of directors and to the stockholders for the proper management of the property. In addition to such general responsibility he must assume direct responsibility for the financing of the company. He must have personal contact with banks, bankers, investment houses and trust companies. He must know the intricate fields of finance. He must be a judge of market conditions and of economic trends in order that he may place his securities at the lowest costs in the long run. He must be a man whose previous record inspires confidence in the project. He must have

a broad knowledge of the utility field, with a temperament which will not restrict the progressive efforts of his responsible subordinates.

ADMINISTRATIVE TALENT THAT IS NOT WITHIN REACH OF SMALL UTILITIES

The vice-president and general manager will be second in command. He also must be a man versed in economic and business trends, able to administer the property according to those trends and to execute the general policy of the company, to advise and assist the president in all matters of policy and in general to accomplish operation in such a manner that the public will receive the best service at the lowest cost. As general manager he will have contact directly and through his subordinates with every phase of the company's business. He will be informed as to the local situations at each of the many communities served. He will advise the district managers with respect to their particular problems. He will be generally conversant with the usual rates charged for service and the fixed and operating costs involved in such service. He will be familiar with the production costs at the generating stations and the costs of distribution and will be constantly seeking to improve them. He will encourage the acquisition of certain classes of loads and the means used in securing higher load factors and improved efficiency. In particular, he will encourage the growth of the good will of the company by assuring the customers adequate service, courteous and prompt attention to complaints, and reasonable rules and regulations. He will approve publicity programs which educate the customers in the problems of the utility.

The duties of the manager are so broad and general that the services of an assistant manager will be required to see that the policies of the manager are fully carried out, to attend more particularly to the oversight of the operating department, to study and report concisely to the manager the various special and routine reports and analyses which are submitted in detail to the manager, and in general to relieve him of much of the routine work and work of lesser importance so that the maximum of time may be given to constructive thought and its application to the policies of the utility.

The second vice-president will be charged with the leadership of the engineering and construction department. The duties connected with the physical expansion and replacement of the plant are of such importance that the president is warranted in assigning them to an executive practically co-ordinate in rank to the first vice-president and general manager, and in assigning them to an executive reporting directly to him. The position requires the services of a particularly skilled and technically trained engineer, for he must be responsible for the selection and installation of apparatus that is as economical in first cost as possible, running costs being considered. In this connection, and relating particularly to power plant construction especially, keen judgment is necessary in the construction of a plant with the lowest over-all cost, since there are so many ways in which running costs may be saved, but many of these ways create added fixed costs in greater amount than the operating savings produced. The ability to maintain a reasonable investment figure per kilowatt of capacity largely depends upon this officer.

The secretary must possess a fair degree of knowledge regarding tax laws, commercial law and corporation law. He must be versed in corporate procedure and especially with reference to processes involving federal, state and local governments, to which bodies he must frequently submit various reports. Both of these offices would require a definite knowledge of modern utility accounting practice, although in the main the responsibility of direct supervision of accounting will rest in the general auditor or controller. The treasurer must work closely with the secretary because of the fact that these two offices are so closely bound together.

Financial and Fiscal Work.—The discussion of this subject in a previous section leads to the conclusion that there is a direct saving in the cost of financing amounting, for a company of the size and capitalization of the one under consideration, to at least 1 per cent on the entire investment or capitalization, which is equivalent to about 5 per cent of the annual gross earnings.

Another saving in smaller degree results from the various fiscal work of the management corporation in connection with the routine handling of matters pertaining to dividends, stock transfers, etc., of the subsidiary companies. This probably amounts in this case to 0.2 per cent of gross earnings.

SAVINGS THROUGH CENTRALIZED ENGINEERING AND CONSTRUCTION

Specific mention has been made of the saving to local properties in architects' fees, contractors' profits, etc., in connection with engineering work. It has been shown that savings in the purchasing of materials and supplies are made. It has been shown that interconnection of plants by transmission lines affects savings in the reserve capacity necessary and thorough operating savings accomplished. Such savings exist even after the deduction of transmission fixed charges.

It is scarcely within the province of this article to go into the detailed analysis necessary to develop these facts for a given property, but it is entirely within reason to assume that a net saving of from 10 to 15 per cent can be made in the cost of construction. Such savings are reflected directly in the capital structure of the property and in the course of time reflect the same percentage decreases in the amount which the utility must earn for depreciation and returns on its investment. Advertising services are in much the same class. An advertising manager for such a local property would command a salary of upward of $7,500, besides which clerical and stenographic assistance, office space, etc., must be considered. An amount of $10,000 per year is likewise conservative for such services.

The maintenance of a self-sufficient auditing and accounting staff would be necessary for such a property if independently managed. At least one extra high-grade accountant would be required, with more clerical and stenographic assistance. Such assistance would doubtless cost more than $10,000 per year. The accumulation of these savings in operation, as stated herein, totals $136,000 per year for this group. This amount is in addition to other savings discussed herein.

The foregoing exposition of public utility group management may be summarized by the statement that it is nothing more than the application of the principle of quantity production to produce a better product at a lower unit cost enabling the use of the best methods of organization, production and distribution. This principle has placed American industry in a pre-eminent position, and its application to utility service is no less

logical or successful. It has proved to be the only economical method of making good service available to the average community, and if the benefits of such service are to be applied successfully to agriculture, the writer believes this principle must provide the means.

If group management had no other result than the wide distribution and betterment of utility service, it would be fully justified. However, the facts presented herein and other available facts indicate that a saving of from 10 to 12 per cent or more of gross earnings is made for the public. Other savings not evaluated herein may even increase this figure.

Operation.—The pages heretofore devoted to this subject have shown the degree of care exercised in the supervision of operation. It has been shown that in some cases outside assistance can be secured in replacement of services in valuations and rate cases, but that in the main these sources lack the advantage of continuous contact with a given situation. Certain other functions, such as purchasing advantages or insurance savings, are not replaceable under any other form of organization.

A brief review of the various operating functions previously discussed will serve to show the accumulation of operating savings which result from group management.

In the matter of operating efficiency, it has been shown how the building up of transmission network serves to reduce plant investment and to permit of more advantageous operation. This is largely true for all of the properties of this corporation, for while some large cities are served, about twenty times as many small communities are served.

The administrative section of this article has discussed the subject of general officers. Other supervisory officers in addition to general officers would be needed.

It is doubtless true that the individual plants comprising each property would make some progress in operating economies. But to a larger extent it is true that such progress has been hastened by perhaps as much as five or ten years and carried very much further through management corporations.

In the matter of purchasing, an average saving of about 10 per cent or more is shown. So far as this relates to additions to property and plant, the saving is shown in a previous section. There is likewise a great saving in the purchase of operating materials and supplies, where the same principles apply. Even materials purchased by the local properties are subject in large degree to the same considerations, for bidding thereon is based upon a knowledge of the purchasing power back of the local property. The experience of the management corporation is that more than $25,000 per year will be saved in operation for such a group as is under consideration.

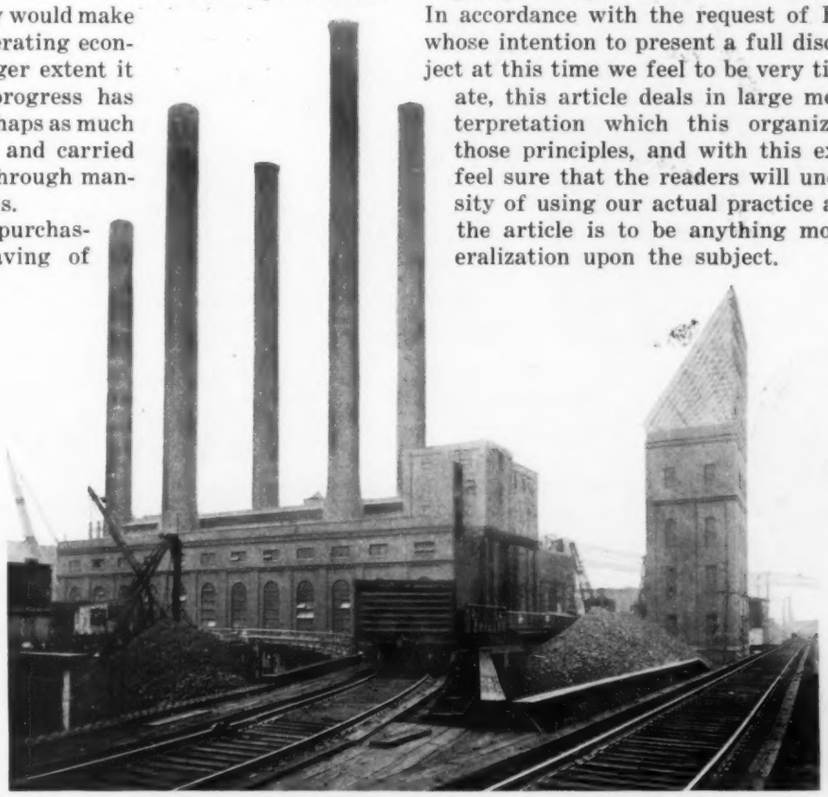
OTHER SAVINGS

Savings made by local properties in insurance are large. For properties of the size under construction, annual savings of $75,000 per year have been made.

Property valuations once made must be revised in the course of time. Perhaps a new valuation every six or seven years will be required. Sometimes circumstances require that this work be done oftener; on other properties it may not be done that often. Careful estimation of the difference in charges of independent appraisers and the cost of our own organization indicates that the saving, spread over the period of usefulness of the valuation, will approximate from $6,000 to $7,000 per year.

The value of services on rate matters has been given careful consideration. Savings in this respect will aggregate $10,000 per year, for such an amount must be spent either in the hiring of specialists from time to time or in the employment of a rate staff by the local group, and the amount named seems conservative on either basis.

In conclusion, while we regret that the presentation of this subject has required so much space, we feel sure that an adequate presentation of the principles involved in group management cannot be shortened to any extent. In accordance with the request of ELECTRICAL WORLD, whose intention to present a full discussion of this subject at this time we feel to be very timely and appropriate, this article deals in large measure with the interpretation which this organization places upon those principles, and with this explanation, we also feel sure that the readers will understand the necessity of using our actual practice as an illustration if the article is to be anything more than mere generalization upon the subject.



Waterside station of Louisville Gas & Electric Company, Louisville, Ky.

National Section Chairmen

(Diagonal group)

1. J. B. Woodyatt, Canadian
2. P. H. Chase, Eastern
3. J. P. Pope, East Central
4. A. C. Marshall, Great Lakes
5. F. H. Brooks, Middle West
6. W. P. Schwabe, New England

J. E. Davidson
Commercial

W. B. S. Winans
Accounting

Geographic Division Presidents

(Corner groups)

7. Carl J. Snyder, North Central
8. D. C. Green, Northwest
9. S. Waldo Coleman, Pacific Coast
10. Arthur Prager, Rocky Mountain
11. B. C. Edgar, Southeastern
12. H. B. Flowers, Southwestern

W. A. Jones
Public Relations

C. F. Hirshfeld
Engineering

The Competitive Market
for Domestic Electric Service

By Col. C. F. Lacombe
Consulting Engineer, New York

Budget expenditures of American families measured against prices of electric service. Only 105 utilities of 376 are within reaching distance of the market

IN THIS ARTICLE Colonel Lacombe has made a laborious and detailed survey of the budget expenditures of American families by income classes. He has taken these data and balanced them against the prices offered for these services by 376 large utilities. His conclusions are that 39 utilities only give prices that are competitive in the market and that 105 utilities only out of the 376 are in reaching distance of this market even when allowing a preferential for electric service.

The conclusions of Colonel Lacombe are that if this market is to be served by electricity, the utilities must readjust prices to these services, reduce the cost of appliances to buyers and get out and sell electric service on a competitive basis.—EDITORS.

IN SELLING any product which fills a necessity or furnishes a great economic service to most of the population, the fundamental elements of the market should be studied as to the product and the methods pursued to cultivate the field. The full development of this market depends upon an analysis of the basic factors of public demand and persistent cultivation of these elements.

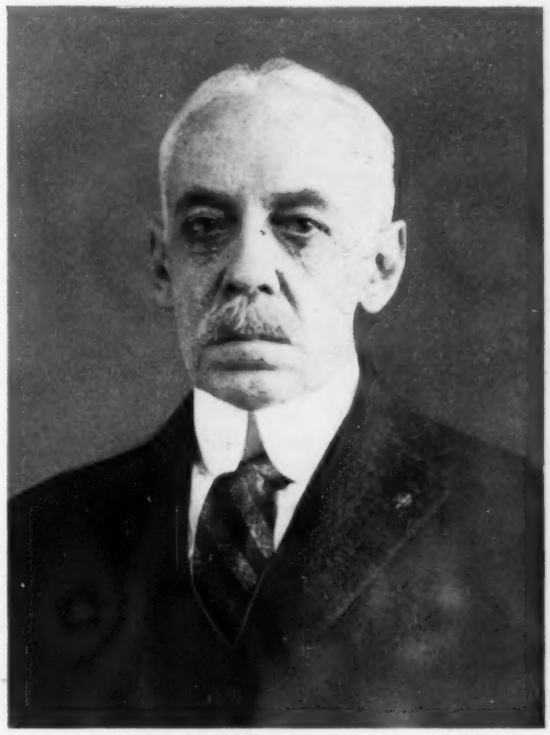
Such an analysis must comprehend not only the costs of production, distribution and service, selling price and profit but also the present and potential competition of other products and means of overcoming such competition.

It does not appear that the electric light and power industry has studied its market in terms of the competition of other industries. The following method is offered as a means of determining the available market for domestic electric service in any section or city of the United States and in a later article a proved method of reaching the market will be demonstrated.

Domestic service involves furnishing in one form or another the light, heat and power required to perform the homely domestic tasks of every-day life. In addition to lighting, there are cooking, water-heating, washing, ironing, cleaning, refrigeration, power radio, cooling or ventilating and many other incidental uses of convenience.

While electric lighting was introduced slowly and against strong competition with gas and other illuminants, it now has the field practically to itself; but all other applications of electricity to amplified domestic service, except the flat iron and some incidental appliances, are still in competition with fuel, ice, public laundries and other agencies.

The so-called monopoly of a power and light utility does not exist in these services except for the preferential price that should be obtained for electricity on account of its quality of instant service, superior cleanliness, convenience, safety and adaptability. The fact that electric service still faces such strong competition in spite of these qualities is a striking proof of the fact that no thorough market analysis has been made.



Col. C. F. Lacombe

NECESSARY REQUIREMENTS TO GET THE BUSINESS

The way to get the domestic power business from the larger number of families with small and medium incomes, and the only way to get it, is to compete with the fuel, laundry and ice industries for the amount of the family budget that must be spent for these purposes. To an extent the electric industry is in an advantageous position, for, in salesmen's language, it has an approach through electric lighting, which now has no real rival.

On the other hand, however, this may account for the

relatively slow growth of domestic power service, the power companies having learned to think in terms of lighting, so maintaining prices too high to secure public acceptance of electricity for household uses. A family with an income of $3,000 to $4,000 will not buy an expensive range, refrigerator, washing machine, ironer or water heater even on the installment plan if the costs of service and maintenance are much higher than the cost of coal, ice or other services. Why should they? The disagreeable handling of coal in a range with the resultant ashes is not very bad and is quickly done. Even if continually repeated, this process is endured in hundreds of thousands of families so long as it saves money. This money invested in a Ford or a radio may give far more pleasure and contribute more to the general welfare of the family than an electric range or refrigerator. There are other kinds of ranges, but there is no substitute for an automobile or a radio.

People will save money to buy so-called pleasures or luxuries in which all share, rather than to change living conditions to which they are thoroughly accustomed.

Fully to secure public acceptance of domestic power service the average cost of the various appliances must be reduced. This can be done only through quantity production, which in turn depends on the fullest market development. Such development will come when competitive prices are made for domestic electric power by which it can be used economically to a greater extent and by many more families than can use it now. When this combined result is obtained, the hoped-for electrification of the home will come true and not be an empty promise to the great mass of American families.

If the domestic power business is desired by this industry, the price makers must think in terms of their customers' pocketbooks.

Preference is always shown for electric lighting, but for other domestic services competitive prices must be nearly met or the business will not be obtained by the electric utility. In the field of domestic service the householder is not helpless; he can use something else if electric service is beyond his means, and to get his business the electric industry must make prices for equivalent blocks that will meet competition, allowing for the preferential advantages of electric service.

Although this paper does not list them, there are 39 companies in the United States operating under price schedules that really compete for domestic service and these companies include many of the most prosperous and best known companies in the country.

Analysis of Family Budgets

In order to support these statements it is necessary to establish what is the amount of the family budget for fuel and light purposes in families of varying classes of incomes throughout the country. The competition to be met is, of course, the price made by the competitive industries already mentioned. The market is the extent to which fuel, oil, gas or electricity can be used for the amount of money that each family can afford to spend to meet, first, absolute needs; next, necessities in convenient form, and, finally, the full use of every comfort within the reach of ample means.

The actual demand for electric service will always be a function of the amount of the family budget that can be spent for these domestic requirements. In this study house heating has not been considered. The actual annual expense of fuel and light must be determined for a family with the minimum grade of income that may be selected as forming the base of the total market pyramid open to the competition of electric service. Given the annual family expense of fuel and light that is spent throughout the country from this minimum income, the proportionate expense for higher incomes can be estimated in order of size.

From the figures of this actual total expense for fuel and light the relative expense can be fairly determined for lighting, cooking, refrigeration and water heating or any combination of them for each size of income. The actual out-of-pocket expense is used in this process and not a figure worked up from minimum "cost of living" percentages.

These costs for lighting, cooking and other operations by fuel, etc., are the competitive prices of the fuel industries that must be met by electric service if it is desired to supply domestic power service. It must be remembered that a great asset of the electric business lies in the safety and flexibility of its service, the perfect cleanliness of electricity and its unequaled superiority of convenience that should enable the utilities to obtain a preferential price in the open market. Opposed to these advantages, it must be remembered that fuel must be used for house heating and in consequence electric cooking must be sold against the usual practice of using the same type of fuel for the range.

Analysis of Incomes

Having assumed the minimum income that can afford to buy electric service in addition to lighting and the amount of the budget that can be spent from that income, it is further necessary to ascertain the amount and number of incomes of each size throughout the country and obtain the percentages of the population served, having each size of income.

If the amount and number of incomes of each size in the United States are estimated, the number of families reached by electric service can be classified by incomes and then by the respective annual family budgets for fuel and light. Multiplying the number of families in each class of income by their respective fuel and light budget, a total figure representative of the entire market is obtained.

Against the individual family incomes and budgets can be set up the respective costs of these forms of electric domestic power service by allotting to each form of service, from the recorded data, the kilowatt-hours used for lighting and necessary for use for refrigeration, cooking, water heating, etc., and multiplying them by the price in cents per kilowatt-hour they would obtain under the many various price schedules now in use.

From this comparison it can be seen whether or not the prices for electric service will compete with those of the competitive industries, with special reference to the smaller incomes that aggregate the largest market.

Much valuable information can also be obtained from these calculations which would guide utilities in making competitive prices, if desired, as well as in the establishment of more extended markets for appliances if prices are made that encourage their use among the largest contingent of the families in the country—namely, that with the smaller incomes.

The results of this process averaged for about half the population of the country will be given later by way of illustration only and not for application. But the authorities used in this article give the information in such form that a company interested can make a study of its own section from the data given, using certain

simple assumptions as to family expenses, distribution of income and so on that have been used in this example and obtain a comparison even closer for a given section than is obtained in this average of the whole country. A particular element of value in this analysis is that it can be applied to almost any locality and need not be rejected as a mere general average.

Establishing the Fuel and Light Budget

The authority taken for family fuel and light expense was Bulletin 357 of the United States Bureau of Labor Statistics, entitled "Cost of Living in the United States." It is referred to frequently as a base reference in many other statistical reports on this subject. It is the result of an investigation made in 1918 and 1919, the data being secured by personal visits of federal agents to the homes of wage earners and small-salaried men. Specific restrictions were applied to the survey. The families from which data were obtained were white and were composed of either wage earners or salaried workers not in business for themselves. The family taken as a minimum consisted of a husband and wife and a child, who was not a boarder. This family must have kept house in the locality for at least the year covered, and 75 per cent of the income must come from the earnings of the breadwinner or others contributing all earnings to the family support. Data from slum, or charity, or non-English-speaking families that had been less than five years in the United States were not taken.

The information obtained came from 12,096 families in 92 cities and 48 states. Fuel and light expenses are given for 11,793 families, of which 8,195 lived in houses and 3,598 in apartments.

The incomes classified run from $541 per annum to a little more than $3,000, and those of families from $2,100 to $3,000 have been taken as the basic income class in this article. It is not possible to establish budgets much below this class except by comparison and inference from the expenses of that class.

There are 1,038 returns given of families with incomes from $2,100 to $3,000, and the base budget of this study is established on the expenses of fuel and light of this group. A further reason for selecting this class is because it appears that below this income, which averages about $2,600, it would be beyond the means of such families to buy relatively expensive electric appliances and in many cases the houses of families below this size of income would not be wired to use the large appliances, particularly if separate circuits and meters were required.

In using the data in Bulletin 357 for various sections in the country it will be found to vary in the fuel and light budget with the latitude or climate. In this article the fuel and light budget is averaged over the United States, and the prices given have been corrected to 1925 prices. In the bulletin the final average use of electricity appears extraordinarily small; it varies apparently up or down with the schedules of prices, running as high as 27 kw.-hr. per month in some cities.

Base Budget $84 per Year

After a close analysis of these figures with such other schedules of actual expense as were available it appears that the average expense for families with incomes between $2,100 and $3,000 annually throughout the country is about $84 a year, or $7 a month for lighting, cooking, water heating, ice, etc. From this figure there can be established without much error the budget for rising incomes, from the base of $2,100 to $3,000 to the higher limit of $25,000 a year.

Many variations can be imagined in the increasing fuel and light budget as the amount of income rises—larger houses or apartments, garages, servants, increasing families and others—but the scale given is logical and was made before the equivalent scale of prices for electricity was calculated, yet the coincidence of price and competitive costs is remarkable in the 39 companies meeting the lowest budget.

Table I—Budgets for Fuel and Light in Families with Different Incomes

Incomes up to	$2,100 to $3,000		$4,000		$5,000		$6,000		$7,000		$8,000		$10,000		$25,000	
Expenses for fuel and lighting for..	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year	Month	Year
Lighting	$2.00	$24.00	$2.20	$26.40	$2.50	$30.00	$2.75	$33.00	$3.25	$39.00	$3.75	$45.00	$4.25	$51.00	$6.00	$72.00 up
Cooking	4.35	52.20	4.80	57.60	5.84	70.00	6.25	75.00	6.66	80.00	7.50	90.00	8.50	102.00	11.00	132.00
Refrigeration	0.65	7.80	1.00	12.00	1.65	20.00	2.50	30.00	3.34	40.00	5.00	60.00	5.75	69.00	6.50	78.00
Water heating	.....	.....	.....	.....	3.00	36.00	4.00	48.00	5.00	60.00	6.00	72.00	8.00	96.00	9.50	114.00
Total monthly	$7.00		$8.00		$13.00		$15.50		$18.25		$22.25		$26.50		$33.00	
Total annually without water heating						$120.00		$138.00		$159.00		$195.00		$222.00		$282.00
Total annually with water heating		84.00		96.00		156.00		186.00		219.00		267.00		318.00		396.00
Lighting and cooking	6.35	76.20	7.00	84.00	8.34	100.0	9.00	108.00	9.91	119.00	11.25	135.00	12.75	153.00	17.00	204.00

The scales of income and corresponding budgets for fuel and light are shown in Table I; it will be remembered that the cost of house heating is not included in these figures. These monthly and annual figures, therefore, will approximate the average competitive prices per family the electric industry has to meet, with the aid of its superior qualities, throughout the United States, if it desires to compete for the full domestic power services now supplied to a large extent by its competitors.

Income Classification Made

The authority taken on incomes is the report of the Treasury Department, United States Internal Revenue, published in 1926, entitled "Statistics of Incomes from Returns of Net Income for 1924." This gives the number of individual incomes reported from less than $1,000 a year to $15,000 a year by $1,000 steps and then on in larger blocks to $5,000,000. The table to $25,000 follows:

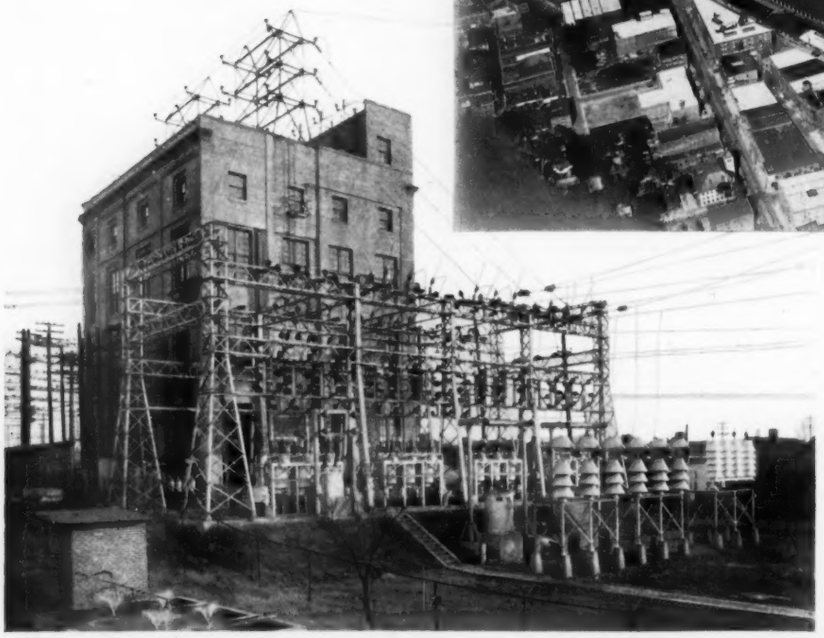
Table of Internal Revenue Incomes

Size of Income	Number of Incomes	Size of Income	Number of Incomes
$1,000	344,836	$7,000 to $8,000	76,126
$1,000 to 2,000	2,431,881	8,000 to 9,000	54,610
2,000 to 3,000	2,112,993	9,000 to 10,000	43,275
3,000 to 4,000	1,181,156	10,000 to 15,000	98,000
4,000 to 5,000	619,744	15,000 to 20,000	49,878
5,000 to 6,000	155,654	20,000 to 25,000	27,842
6,000 to 7,000	107,685		
			7,303,680

(Continued on page 1144)

Tennessee Utilities *Lead* in Southern Business Development

Chattanooga is called the "Dynamo of Dixie"



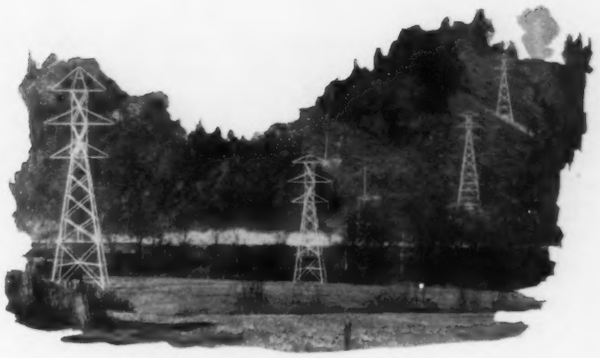
Carter Street substation in Chattanooga receives energy from Hales Bar

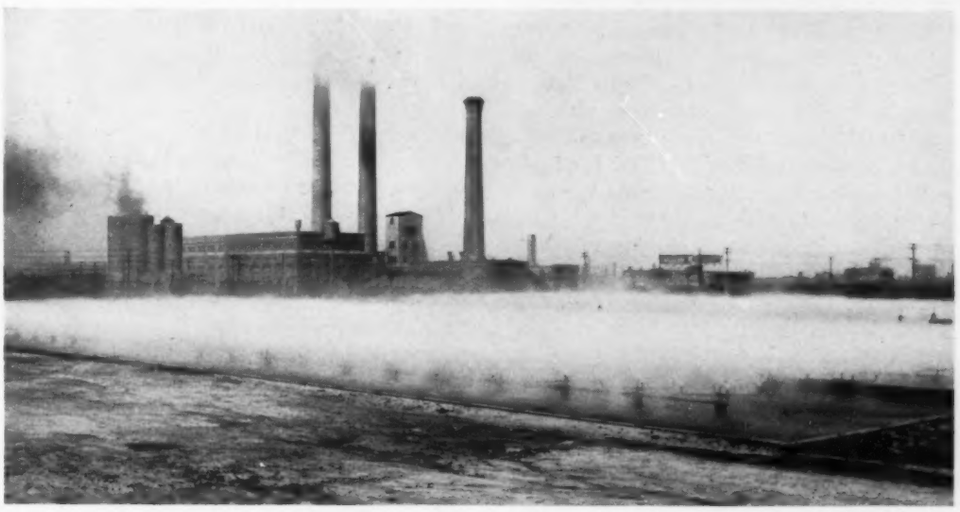
Hales Bar hydro and steam plants of the Tennessee Electric Power Company

At right—One of the 66,000-volt steel tower lines of the Tennessee Electric Power Company

Center — The Fourth Street plant and spray pond of the Memphis Power & Light Company

Lower view—Aerial view of Memphis





For the purpose of this paper, it is necessary to make one fundamental assumption, believed to be correct; that is, taking the number of families in any section or city it is assumed that the income in the cities or sections taken follow the same percentages of distribution as prevail throughout the whole United States as given in the Treasury report, when analyzed. The report gives income distribution by states, counties and cities, so this can be obtained quite closely if an individual section is to be studied.

The figures of incomes and their respective numbers must be closely studied or mistakes will occur by figuring individuals as families, by duplicate returns and other items. In this paper all incomes less than $1,000 a year and more than $25,000 a year have been eliminated. In the classes of income from $1,000 to $3,000 there are more than 2,000,000 single men and women, and in the class of $1,000 to $2,000 there are 706,000 families; the budgets for these individuals and families are very low, are impossible to calculate, and little use of electricity could be expected. Taking these two blocks and adding them together, it is assumed the income that might be obtained for electric lighting would be $1.10 a month per unit. In the class with incomes of $2,000 to $3,000 there are 1,638,550 families making returns for income taxes, and basing the budget of these families on the data given in Bulletin 357, as shown in Table I, their expenses for lighting, cooking, ice and water heating for bathing or washing will be $84 a year.

Comparison of Incomes, Budgets and Schedules of Prices

Having now established a typical scale of budgets and the number of different-sized incomes, it is necessary to find out how the various incomes, budgets and the schedules of prices for electric service fit and the number of families served under each scale of prices classified by the lowest budget it reaches.

To do this, 376 schedules of prices for electric service in cities of more than 20,000 population were computed on a basis of the cost of 30 kw.-hr. average use for lighting and smaller appliances. This figure is probably from 5 to 10 kw.-hr. higher than the average, but as our errors trend to the higher budgets and it is generally used, it has been used here. The prices were also calculated for lighting and refrigeration at 100 kw.-hr.; lighting and cooking at 130 kw.-hr.; lighting, cooking and refrigeration at 200 kw.-hr., and finally, for lighting, cooking, refrigeration and domestic water heating for washing and bathing purposes at 400 kw.-hr. This covers the usual kitchen hot water tank.

This process gave scales of prices by composite groups of companies for their respective cities, states or sections throughout the country varying from a scale meeting the fuel and light budget of $2,000 to $3,000 incomes to those meeting only the budgets of larger incomes of $8,000 to $10,000 and higher.

For example, one composite group of 39 companies offers a scale of prices as follows:

Kw.-Hr.		Kw.-Hr.	
30	$2.08	130	$5.12
100	4.17	200	7.20

These prices fit the budget of the $2,000 to $3,000 income class, which is for lighting, $2; lighting and refrigeration, $2.65; lighting and cooking, $6.35; lighting, cooking and refrigeration, $7. In this budget refrigeration is nominal and water heating would probably be done on the cooking range. On the other hand, another composite group of 53 companies offers a scale of prices for these same minimum amounts of electric service, as follows:

Kw.-Hr.		Kw.-Hr.	
30	$2.72	200	$16.01
100	7.79	400	29.28
130	10.75		

These prices meet the budget of a $7,000 to $8,000 income, but only for the minimum amount of electric service; when this is increased to the normal demand for a family with this income, as shown in Table IV, the prices do not meet the budget.

The budget for an income of from $7,000 to $8,000 is estimated to be: Lighting, $3.75; lighting and refrigeration, $8.75; lighting and cooking, $11.25; lighting, cooking and refrigeration, $16.25; lighting, refrigeration and water heating, $22.25. Refrigeration and water heating in this class amount to a material item.

Taking the data available of the 376 companies studied, we can obtain the population reached by each as published in the McGraw-Hill "Directory of Central Stations" and when the scales of prices are classified with the base budget kilowatt-hours as given in Table III we can add together the population served by each budget class of companies.

Table II—Number of Families, Individuals and Units as Estimated in a Total Population of 54,500,000 Served by 376 Companies in Towns of 20,000 Inhabitants or Over.

Incomes	Families Served*	Per Cent
$1,000 to $3,000	12,549,050	23†
$2,000 to $3,000	3,914,700	41
$3,000 to $4,000	2,678,900	29
$4,000 to $5,000	1,432,200	15
$5,000 to $6,000	381,900	4
$6,000 to $7,000	238,700	2.5
$7,000 to $8,000	171,800	1.8
$8,000 to $10,000	229,100	2.4
$10,000 to $25,000	200,000 (estimated)	

*These figures represent individuals and units served, as explained in the text.
†This figure is the percentage of the total population of 54,500,000; the remaining figures in this column are the percentages of the remainder of 54,500,000.

To illustrate this by using the preceding example, the 39 companies offering the lower scale of prices serve a population of 9,617,000, according to the sum of the populations given for each in the McGraw-Hill "Directory." In consequence, all families of all grades of incomes would be served by the rates which gave these lower schedules of prices, for electric service would be within the reach of all.

On the other hand, the 53 companies with the higher scale of prices serve a population of 7,038,000; therefore, even on the basis of the minimum or basic usage adopted for ranking purposes in this calculation, it is only in families having incomes of from $7,000 to $8,000 that the electric industry nominally meets competition from the fuel industries. Actually it does not meet this competition when the usage in kilowatt-hours is expanded to that which a family of this income would require (see Table IV).

With the exception of lighting, families of lower incomes in this block of population could not afford electric service at these prices. Nominally families with incomes higher than $7,000 to $8,000 could also use electric service at these prices. Similarly this explana-

tion applies to each group of companies and composite scale of prices in Table III of prices for the minimum hour basic usage.

INCOME TAX REPORT USED AS BASIS FOR CLASSIFICATION OF CUSTOMERS

As nearly as could be ascertained the federal income tax report, when expanded to the full population represented by it, covers from 23,000,000 to 25,000,000 persons. Under the assumption that this cross-section of the population fairly represents the rest of the United States as to incomes, Table II, with one exception, shows the number of families served by the 376 companies canvassed. A population of about 54,500,000 is represented in the number of individuals and families shown in this table. The apparent discrepancy in the number of the population paying income taxes and the total population of the country cannot be explained by the writer.

The exception just mentioned is the first line of the table, designated "individuals and units," which represents single men and women with incomes $1,000 to $3,000 and families with incomes less than $2,000, all taken as single units and assumed to buy little but electric lighting.

The number of families of each class of income as given and served by the 376 companies is derived by certain corrections as explained just after the Internal Revenue table of incomes. Each block of population served by each group of companies as shown in the second column of Table III is corrected by deducting first for individuals giving income returns but who do not rank as families, then for families with less than $2,000 incomes and for certain duplications until the percentages of total families with the various incomes in the 54,500,000 population can be obtained on the assumption that the returns for the whole country are fairly true for sections of it.

A comparison can now be made of the respective budgets of families with varying incomes with the schedules of prices made by the utility companies on a basic gage for ranking purposes for 30, 100, 130, 200 and 400 kw.-hr. Beginning with the $2,000 to $3,000 income budget, it was found that 39 companies, serving a population of 9,617,000, met this budget with their prices and were grouped together because their prices were nearly equal. Continuing the comparison of each budget with the schedules or prices, it was found that 66 other companies, serving a population of 11,941,000, met this budget of families with incomes of $3,000 to $4,000 and were similarly grouped. Continuing this comparison for each budget as given in Table III with the schedules of prices gave the segregation of companies and population served in column 2 of Table III. Opposite this and to the right of this column is set up the budget and schedule of prices that most nearly equal each other. To the left is given the lowest class of income whose budget is met by this schedule of prices. It must be remembered that in each block of population, 9,617,000 or 11,941,000 and so on, there are families with all classes of incomes in about the percentage shown in Table II. If the budget of the lowest grade of incomes is met, it will be found it will meet all grades of incomes even with increased usage. If this budget is not met, then one class of income after another will pass out of the field of electric competition as the schedule of prices for electric service rises.

Table III—Kilowatt-Hours, Budgets and Price Schedules Bid. Minimum Hour Basis

Budgets for fuel and light of families with incomes as given, contrasted with the typical schedules of prices for 30, 100, 130, 200 and 400 kw.-hr. as bid by the groups of companies of this minimum hour basis.

Income Class	Number of Companies Meeting This Budget at Minimum Kilowatt-Hour Usage	Population Served	Block of Kilowatt-hours	Lighting 30	Lighting and Refrigeration 100	Lighting and Cooking 130	Lighting, Cooking, Refrigeration 200	Lighting, Cooking, Refrigeration, Water Heating 400
$2,000 to $3,000	39	9,617,000	Budget	$2.00	$2.65	$6.35	$7.00	.....*
			Price schedule	2.08	4.17	5.12	7.20	
$3,000 to $4,000	66	11,941,000	Budget	2.20	3.20	7.00	8.00	.....*
			Price schedule	2.55	6.14	6.02	8.26	
$4,000 to $5,000	95	14,000,500	Budget	2.50	4.16	8.34	10.00	$13.00
			Price schedule	2.76	7.18	7.26	9.97	18.01
$5,000 to $6,000	48	3,719,000	Budget	2.75	5.25	9.00	11.50	15.50
			Price schedule	2.96	7.66	8.27	11.97	22.55
$6,000 to $7,000	34	4,787,000	Budget	3.25	6.69	9.90	13.25	18.25
			Price schedule	2.86	7.65	9.72	13.54	24.09
$7,000 to $8,000	53	7,038,000	Budget	3.75	8.75	11.25	16.25	22.25
			Price schedule	2.72	7.79	10.75	16.01	29.28
$8,000 to $10,000	15	867,500	Budget	4.25	10.25	12.75	18.50	26.50
			Price schedule	3.05	8.62	12.34	18.09	31.35
$10,000 to $25,000	26	2,588,000	Budget	6.00	12.50	17.00	23.50	33.00
			Price schedule	3.64	11.49	15.22	23.02	41.78

* Water heating omitted, as probab.y done on range and cannot be separately estimated or counted upon.

Table III is really only a ranking table in order to rank the companies according to their schedules of prices for the same minimum number of kilowatt-hours which would replace the fuel used by the minimum income class.

FINAL COMPARISON OF ACTUAL ELECTRIC PRICES BID AGAINST BUDGETS

This comparison in Table III would be final except for the fact that as the income of a family increases and its requirements become larger, it will require more fuel and light and consequently more kilowatt-hours to supply its requirements for lighting, refrigeration, cooking and water heating. The second scale or gage shown in Table IV represents the same schedules of prices applied to the higher kilowatt-hour usages as shown by the line entitled "Increased Block of Kilowatt-Hours." In consequence, it will be seen that companies which under the first arbitrary gage would meet certain incomes will now only meet incomes several grades higher than the original. In other words, their field of competition has been decidedly decreased, and their bids for domestic power service, as shown, will enable them to get only some sporadic domestic business for convenience purposes from families with incomes from

about $5,000 up, except for lighting, which will probably be obtained from all classes.

This presentation shows how these various companies bid for the blocks of energy necessary to replace coal and oil for the domestic power services required by the graded incomes.

It is not to be assumed, however, that this article views this problem as one of kilowatt-hours only. This method of presentation has been chosen to show the competitive problem. The problem of fixed charges on investment, etc., should be provided for by a correct structure of price schedule.

Domestic Power Service Beyond Reach of Average Customer's Pocketbook

It is seen at once that, except for lighting, more than two-thirds of these companies offer energy for domestic power service at prices well above the means of the smaller income classes. This service will be used only by the higher income classes able to afford many extra convenience and luxuries.

Taking the 54,500,000 population approximately represented as served by the 376 companies studied here and calculating their total budget or means that would be spent for fuel and light, this would amount to an expenditure, including water heating, of $1,298,000,000. This is the amount that this population would spend at the competitive prices they can get from the other industries.

If we recalculate this on the basis of the prices offered them for domestic power service by the 376 companies, which includes those which really do compete, it would cost this population $2,336,000,000 if they used electric service exclusively at present prices.

The remainder of the population of the United States up to 120,000,000 must live in cities and towns of less than 20,000 inhabitants or in the country. It seems probable that their budgets would be more economical and less than those of the urban population, so that if one assumed to double the first total figure to get a view of the possible total market, their budgets must be discounted for this reason.

The most prevalent accepted estimate of the present revenue from the domestic consumers throughout the country is $450,000,000 a year. If we assume that 54,500,000 population represents half of the country and supplies 60 per cent of this revenue, then $270,000,000 represents what the 376 companies are getting now, whereas their available market on the basis of this survey would be $1,298,000,000, or approximately $1,000,000,000 more than is now being obtained. If half of this revenue was secured in the next ten years by the increase of the load factor of those consumers now connected, our earnings per dollar of investment in the domestic class would improve in a much higher proportion than the increased percentage of new investment required to get it.

It will be seen from Table III that the base schedule used by 39 companies for the $2,000 to $3,000 class really meets the family budget except for ice. Like water heating, disregarded in this and the $3,000 to $4,000 class, electric refrigerators and refrigeration will not be used much in these two classes on account of the first cost of the appliance alone and the small amount of ice required.

The price schedule of the $3,000 to $4,000 class, allowing a preferential price for electric service, is within reaching distance of the family budget of this class, except for refrigeration. It will be noticed in the composite schedule of prices of this class that 100 kw.-hr. for light and refrigeration is actually higher than 130 kw.-hr. for lighting and cooking. This is because separate prices with separate meters have been made for lighting and cooking, but no inducement has been made to obtain refrigeration, the high first step of the price schedule being retained for blocks of 100 kw.-hr. or more on the lighting meter. It may be stated, therefore, that 105 companies out of the 376 studied compete for domestic power service or could do so with simple adaptation of some schedules to the competitive markets.

After passing the $3,000 to $4,000 class, except for lighting and cooking in the next price schedule, the succeeding price schedules are too high to compete with other industries. So few companies bid for water-heating that this price is very high; it would be, except

Table IV—Increased Kilowatt-Hours, Budgets and Price Schedules Actually Bid

Budgets for fuel and light of families with incomes as given, contrasted with typical schedules of prices for the increasing numbers of kilowatt-hours due to larger use entailed by needs of higher incomes and larger families.

Income Class	Companies Listed by Minimum Budgets Met See Table III	Population Served	Block of Kilowatt-hours	Lighting 30	Lighting and Refrigeration 100	Lighting and Cooking 130	Lighting, Cooking, Refrigeration 200	Lighting, Cooking, Refrigeration, Water Heating 400
$2,000 to $3,000	39	9,617,000	Budget	$2.00	$2.65	$6.35	$7.00	.....
			Price schedule	$2.08	$4.17	$5.12	$7.20	.....
			Increased block of kw.-hrs.	34	111	146	227	.....
$3,000 to $4,000	66	11,941,000	Budget	$2.20	$3.20	$7.00	$8.00	.....
			Price schedule	$3.05	$6.82	$6.76	$9.37	.....
			Increased block of kw.-hrs.	37	133	180	281	433
$4,000 to $5,000	95	14,000,500	Budget	$2.50	$4.16	$8.34	$10.00	$13.00
			Price schedule	$3.40	$9.56	$10.06	$14.01	$19.48
			Increased block of kw.-hrs.	41	158	197	322	483
$5,000 to $6,000	48	3,719,000	Budget	$2.75	$5.25	$9.00	$11.50	$15.50
			Price schedule	$4.02	$12.13	$12.53	$19.27	$27.22
			Increased block of kw.-hrs.	48	188	220	370	575
$6,000 to $7,000	34	4,787,000	Budget	$3.25	$6.69	$9.90	$13.25	$18.25
			Price schedule	$4.57	$14.38	$16.38	$24.98	$34.52
			Increased block of kw.-hrs.	55	235	255	450	675
$7,000 to $8,000	53	7,038,000	Budget	$3.75	$8.75	$11.25	$16.25	$22.25
			Price schedule	$6.97	$18.30	$20.96	$36.01	$49.41
			Increased block of kw.-hrs.	62	270	290	519	783
$8,000 to $10,000	15	867,500	Budget	$4.25	$10.25	$12.75	$18.50	$26.50
			Price schedule	$6.31	$23.18	$27.54	$46.97	$61.31
			Increased block of kw.-hrs.	73	308	346	741	1,130
$10,000 to $25,000	26	2,588,000	Budget	$6.00	$12.50	$17.00	$23.50	$33.00
			Price schedule	$8.84	$35.37	$40.52	$85.22	$118.00

when prices were designed to encourage a high domestic load factor.

The composite schedules of prices from the $5,000 to $6,000 class up are practically non-competitive, and domestic power service would be used only for special reasons. Even if the budget given is assumed to be too low, it would have to be much larger to approximate the bids the utilities make for the business.

The schedules show that practically all the inducement prices are included in the lower schedules. The companies offering these schedules are scattered over 23 states. Among the 105 in the two lowest schedules there are utilities generating by steam only, by steam and some water power, by water power with some steam and also straight water power.

The utilities in the higher schedules are also scattered and have a larger preponderance of steam generation. They generally have broad block schedules of prices which frequently employ two meters and require separate wiring. It must not be assumed from this that it is suggested that all rates should be alike. With the best inducement structure based on careful cost analyses, price schedules would vary with the living costs, fuel costs, climate, labor costs and for many commercial and policy reasons.

Only 28 per Cent of the Utilities Compete for Domestic Business

The apparent conclusion to be drawn from these data is that only 28 per cent of the companies compete for full domestic power service. In spite of criticism to which the data may be open in places it gives a sharp indication that the public utility industry is not successfully competing with other industries for this business. It shows that 105 companies in 23 states are competing and would undoubtedly get much more business were cheaper ranges, refrigerators, etc., available. Their earnings on domestic general service are adequate and are of the order of 6 per cent or slightly higher. They are all prosperous and public relations are good, with few revisions by commissions.

The results shown by these companies prove that by basing the schedules of prices on a knowledge of the cost to serve at increasing load factors with sound commercial and public policy adjustments, in a reasonable period of time the electric industry can meet, if it has the will to do so, the competition of other industries for the domestic power business.

The problem seems to lie in the phrase "if it has the will to do so," or if it has to. Some companies have so much lighting, residential and commercial, with small shop power and lighting, that for their financial success there is no great urge to expand domestic service, but if this is the case they are not meeting their full obligation to the community under the monopoly granted them.

Others seem to find that as they get returns of 8 per cent or more on their investment over all their costs there is little use in analyzing the costs of the several classes of service and making each one carry an equitable part of the load of expense and of the return on the investment dedicated to them. In consequence they do not know just which class is being unduly burdened or favored.

They cannot classify and construct their price schedules correctly because they do not know the respective costs and returns. Generally, such companies would not compete for full domestic service because they do not know how to do so safely, and this condition produces fear of results. Still other companies may be in a position where they cannot expand out of the lighting class for financial reasons. Many other economic conditions, not necessarily permanent, however, exist in different cases to make competition with the fuel industries impractical at present, but the success of the 105 companies shows it can be done if there is the will to do it.

This whole analysis involves no quarrel with schedules of prices as they have been. In the formative period of the last twenty years they have put us where we are—far ahead of anything foreseen in 1907.

The higher prices given, speaking broadly, are prices for lighting, because in past days the companies could compete for little else in domestic service. The industry has studied and improved its methods, appliances and efficiencies, but it has not yet applied these processes of evolution to its selling prices as it has to its manufacturing costs. If it wants to compete for domestic service, it is in a position to do so by applying well-known and common-sense principles to its selling prices and revising them from lighting schedules to competing prices for lighting and domestic power service combined.

In other words, it must so arrange its schedule of prices that while preserving its return of fixed charges it can sell many more kilowatt-hours at a decreasing unit cost so that its net total profit, while smaller per unit, when multiplied by the increased units sold will increase with increasing volume of sales. This is in accord with the economic "law of increasing returns."

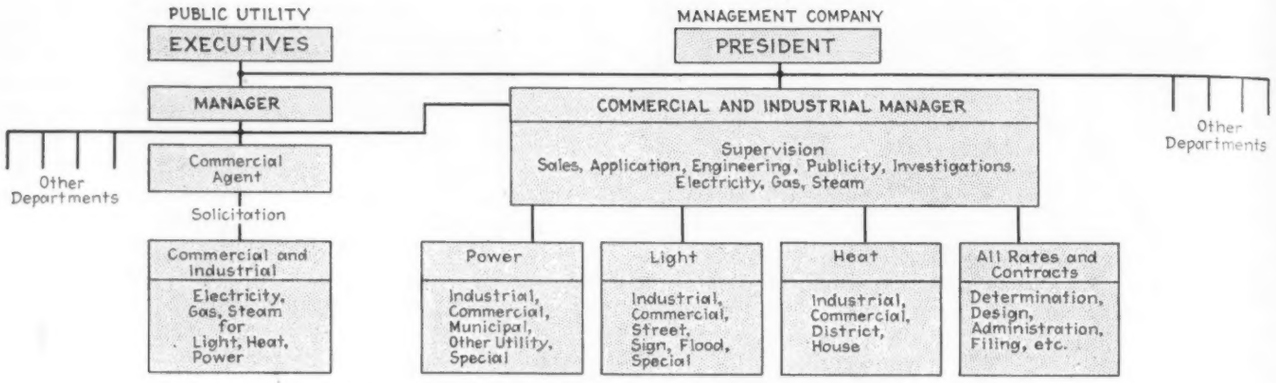
Conclusion

If companies do not desire to do this, then there is only a limited field for intensive selling campaigns for appliances of the larger order of consumption, and one cannot blame the sales manager if he does not sell them in quantity nor can one talk of relieving the housewife of domestic labor. The class in which housewives could be relieved from coal handling, hand laundry work, etc., cannot afford to pay a price far higher than the cost of the fuel necessary, with their labor to do the work.

People will not buy expensive appliances unless they are shown at least a compensatory saving over the cost of the work as now done by them with a preferential allowance for the new electric methods. They certainly cannot afford to buy these appliances when their use heavily increases the cost of domestic service, particularly in the homes of families of the smaller income class.

The present market and competitive situation that this article endeavors to portray is the result of rapid development under myriad conditions over many years. Progress, however, in meeting this problem is being made all over the country, as shown by the agitation within the industry at this time for prices that will obtain domestic business and the trend of changes in rates for this purpose as published from time to time.

The industry will succeed in doing this as it has in other ends to be achieved, but it must be carefully and skillfully done, taking sufficient time in doing it to prevent disturbance of revenues. It must be done from within the industry itself, for the process will only be injured and retarded by prejudiced or uninformed pressure from political sources.



Organization Diagram of Commercial and Industrial Department Service in Relation to Subsidiaries of Large Holding and Management Group

The above chart illustrates the internal organization and co-operation effective in the commercial and industrial department of a prominent Eastern management company in connection with the development of commercial and industrial business in the local utilities under its administration. All the work of the department is in the hands of a manager responsible to the president of the management organization, and the various branches of departmental activity are clearly indicated. Through the manager the department serves the local utilities in co-operation with their local managers, designing rates and carrying on expert commercial engineering investigations and negotiations ordinarily far beyond the scope of the local utilities.

Graphic Illustration of a Small Company's Progress

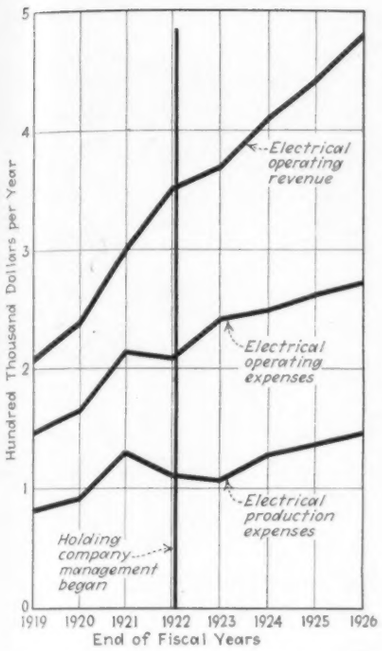
Four Years Under Holding Company Control and Direction Compared with an Equal Period of Isolated Management

THE accompanying charts depict the growth of an Eastern electric light and power company under the "isolated" type of management from 1919 to 1922 inclusive and under centralized management from 1923 to 1927 inclusive. It is impossible to determine how much of the growth is due to the holding company's organization and methods, but it is absolutely certain that the development of the property would have been less rapid had the old régime continued. The curves show that the charges sometimes made that holding company management tends to "milk" an acquired local property have no foundation in this case; that new financial life was put into the system by the change and that the physical plant was better utilized in the new dispensation. Vigorous and systematic commercial development supported by the headquarters organization increased the use of the service per capita and *in toto;* the number of customers was markedly increased, and skilled management applied the benefits of interconnection and many other economies. The price of the service to the public went down, and the property entered upon an era of development and usefulness on a scale far above that of the "good old times."

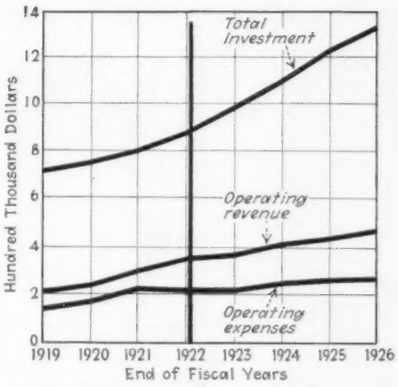
During the entire period analyzed, the population served remained practically constant, thus eliminating a variable often troublesome in utility era comparisons.

Tabulated Comparison of Operations of Small Eastern Utility

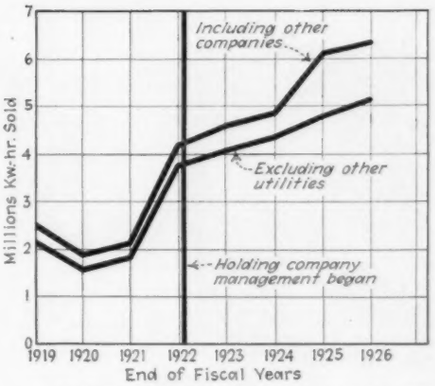
Four Years' Results with Each Type	Type of Management: Single Company	Type of Management: Holding Company
Total operating revenue	$1,101,168	$1,708,195
Total operating expenses	$732,496	$1,012,263
Total net operating revenue	$368,672	$696,722
Total kilowatt-hour sales	10,820,976	21,647,234
Kilowatt-hour sales, excluding sales to other companies	9,287,676	18,918,918
Number customers in 1919	2,837	.....
Number customers in 1926	.....	8,051
Gain in customers in four years*	1,361	3,240
Average population served	27,000	27,000
Total production cost, generated plus purchased energy	$411,579	$517,132
Peak load in kw., minimum	1,060	.....
Peak load in kw., maximum	.....	2,390
Increase in peak load, eight years, kw	.....	1,330
Station rating in kw	1,500	1,500
Total investment growth, four years	$178,919	$337,600
Investment in 1919	$715,674	.....
Investment in 1926	.....	$1,330,542
Cost of electricity purchased	None purchased	$350,914
Cost of coal burned in plant	$271,296	$101,040
Average price of electricity per kilowatt-hour total sales, cents	10.71	7.94
Decrease in above price in per cent under holding company	.....	25.8
Average operating ratio in per cent	66.3	59.6
Use of generating station	All production	Standby
Average plant investment per dollar operating revenue	$2.95	$2.73
Average kilowatt-hour sales per dollar of investment	3.36	4.62
Average system load-factor in per cent	34.5	37.0
Average kilowatt-hour sales per capita per year	88	171
Per cent houses wired	67	94
Electric appliance sales per customer, per year	$2.12	$5.24
Average cost per kilowatt-hour at bus, cents	2.6	1.97
Saving in cost per kilowatt-hour at bus, cents	.....	0.63
Saving in price per kilowatt-hour sold to the public, cents	.....	2.77
Ratio, saving to public in average price per kilowatt-hour to savings obtained by company per kilowatt-hour produced	.....	4.4 to 1


Hundred Thousand Dollars per Year
Electrical operating revenue
Electrical operating expenses
Electrical production expenses
Holding company management began
1919 1920 1921 1922 1923 1924 1925 1926
End of Fiscal Years

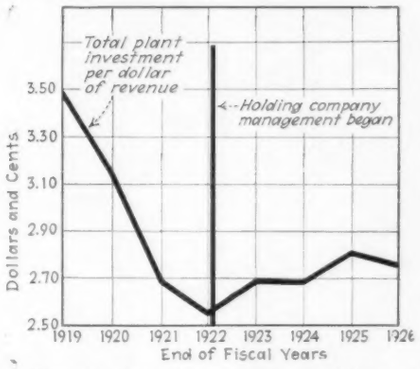
Operating revenue gained 55 per cent during four years of holding company management. Operating expenses increased less rapidly.



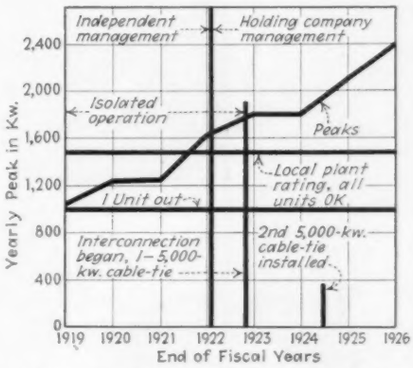
Total investment increased faster than operating revenue because of delayed improvements and extensions to serve unsaturated territory.


Millions Kw-hr. Sold
Including other companies
Excluding other utilities
Holding company management began
1919 1920 1921 1922 1923 1924 1925 1926
End of Fiscal Years

Under single-company management kilowatt-hour sales were sluggish.

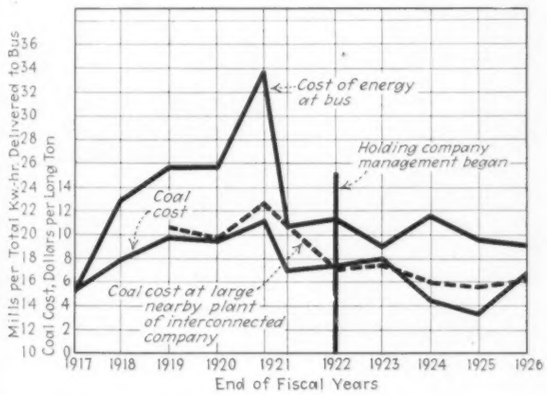

Dollars and Cents
Total plant investment per dollar of revenue
Holding company management began
1919 1920 1921 1922 1923 1924 1925 1926
End of Fiscal Years

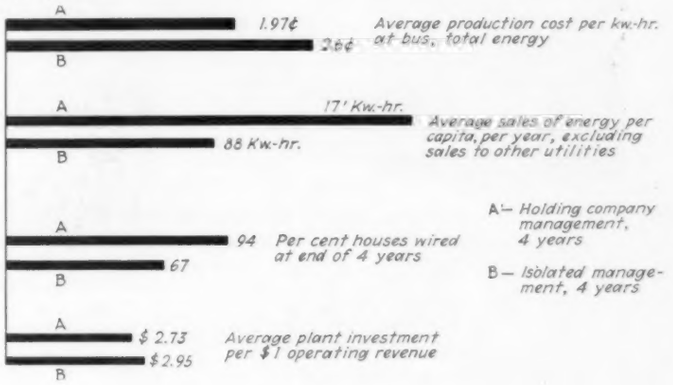
Electric plant investment per dollar of revenue was lower in syndicate period, notwithstanding need of additional funds to repair and build up system.

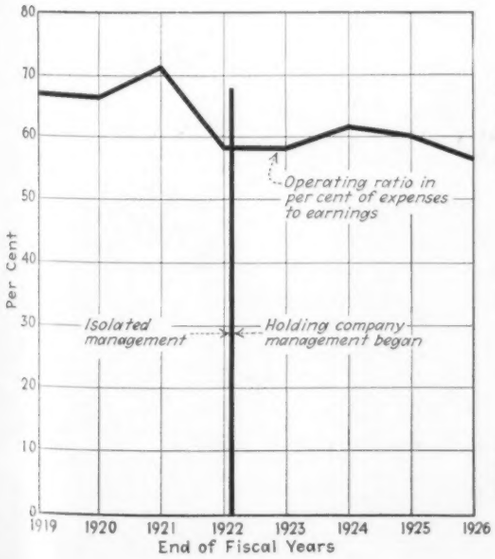


Under isolated management 1,500-kw. steam plant took grave chances of annual overload later avoided by interconnections.

Syndicate management with interconnection brought production costs downward.


Mills per Total Kw-hr. Delivered to Bus
Coal Cost, Dollars per Long Ton
Cost of energy at bus
Holding company management began
Coal cost
Coal cost at large nearby plant of interconnected company
1917 1918 1919 1920 1921 1922 1923 1924 1925 1926
End of Fiscal Years

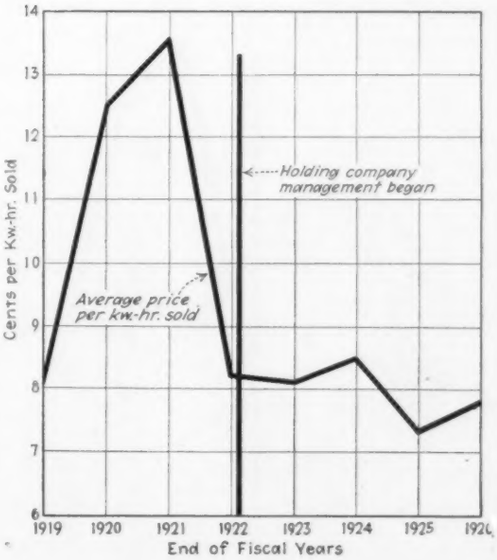


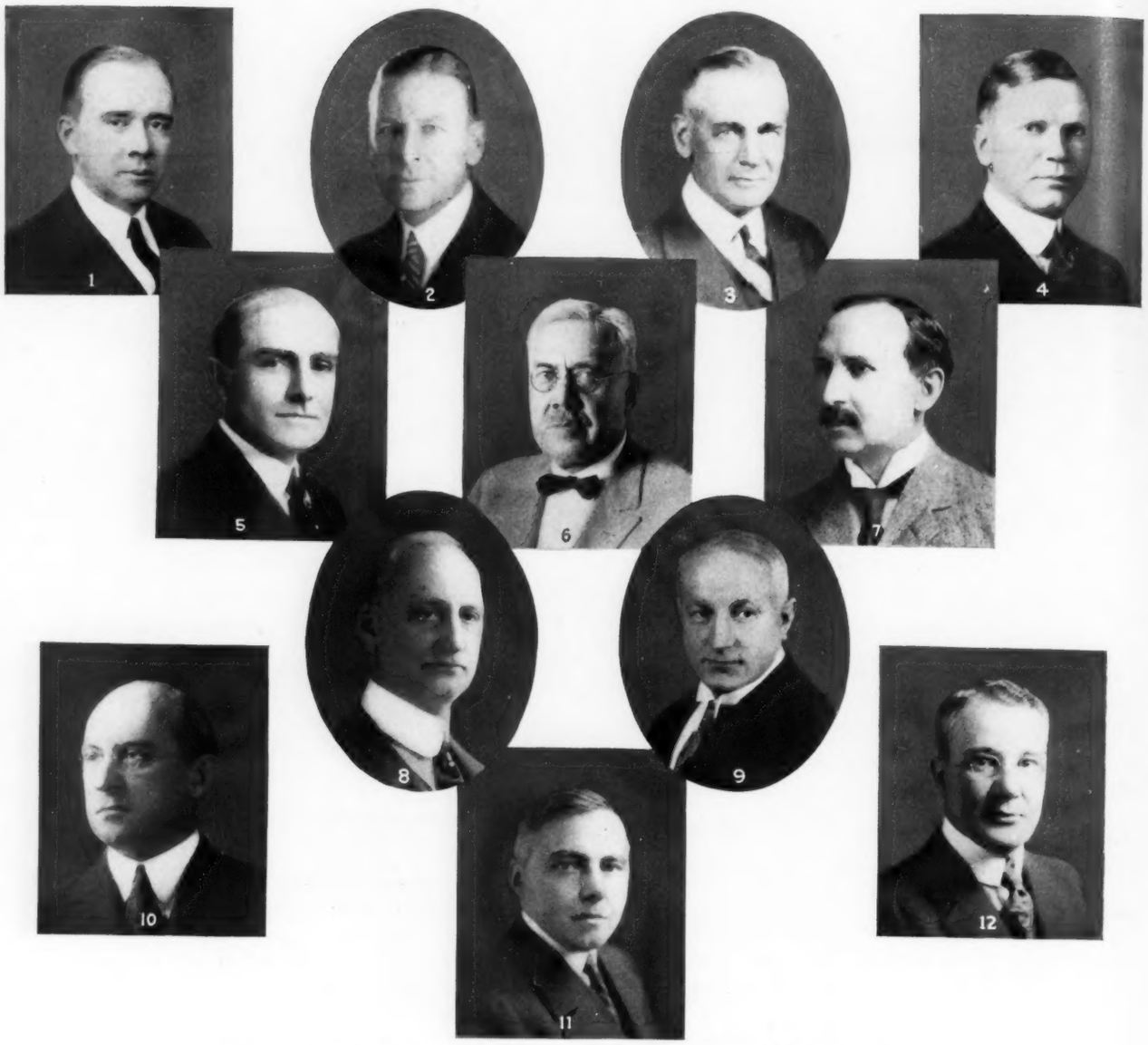

Per Cent
Operating ratio in per cent of expenses to earnings
Isolated management
Holding company management began
1919 1920 1921 1922 1923 1924 1925 1926
End of Fiscal Years

Above—Energy per capita and percentage of wired houses increased under centralized management; production cost fell off and so did plant investment per dollar of operating revenue.

At left—Ratio of operating expenses to revenue has gradually reduced.

At right—The price of service to the public has been lower under holding company management, and trends downward.


Cents per Kw-hr. Sold
Holding company management began
Average price per kw-hr. sold
1919 1920 1921 1922 1923 1924 1925 1926
End of Fiscal Years



Special National Committee Chairmen

1. W. H. Hodge, Advertising
2. Irvin W. Day, Codes and Standards
3. W. C. L. Eglin, Constitution and By-Laws
4. C. E. Groesbeck, Electrical Resources of Nation
5. Britton I. Budd, Electrification of Steam Railroads
6. E. W. Goldschmidt, Exhibition
7. Sidney Z. Mitchell, Finance
8. Frank W. Smith, Lamp
9. W. H. Onken, Jr., Prize Awards
10. R. H. Ballard, Public Policy
11. Edwin Gruhl, Rate Research
12. W. E. Creed, Water Power Development

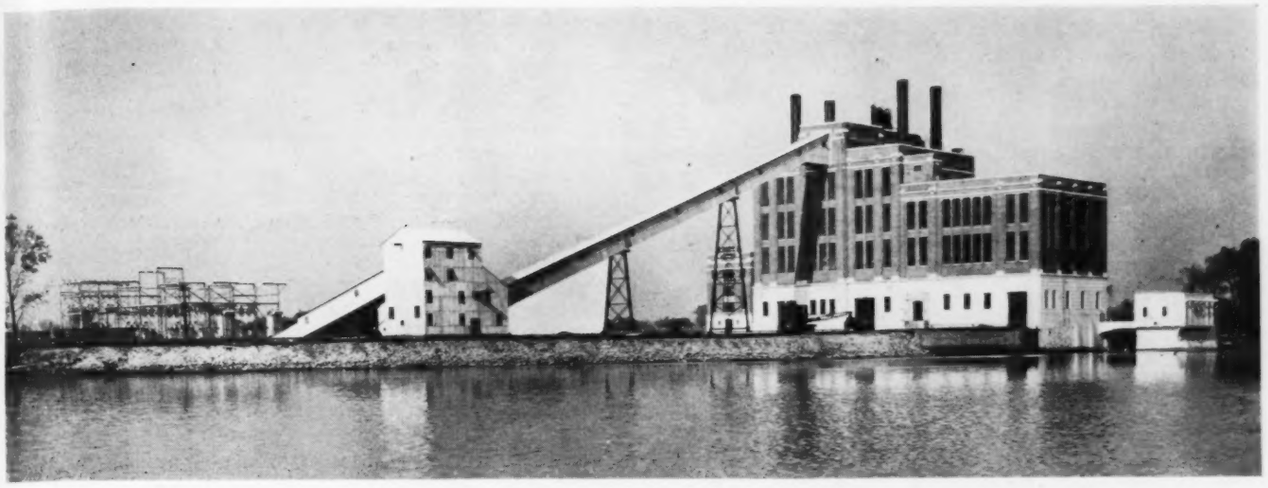
General National Committee Chairmen

Fred R. Jenkins
Educational

G. H. Bourne
Insurance

Howard K. Mohr
Membership

G. C. Neff
Rural Electric Service



Plant of Riverside Power Manufacturing Company, on the Mississippi River north of Davenport, Iowa

Holding Company Operations

Detailed analysis of economies and service improvements rendered by the United Light & Power Company. Functional organization, policies, savings, financing, sales and other topics discussed in specific terms

THE United Light & Power Company operates in ten states, supplying electric railway, gas and electricity service to 433 communities with a total population of approximately 1,750,000. The number of electricity customers is about 350,000 and of gas customers about 150,000. There are 50 electricity-generating stations in the system and twenty gas plants. Among the larger cities the electric utilities of which are in the United group are Kansas City, Mo.; Columbus, Ohio, and the Tri-Cities, which include Davenport, Iowa, Rock Island, Ill., and Moline, Ill. The electric properties fall into four major groups, with four minor systems isolated from the rest. Within the geographical limits of the larger groups extensive plant and system interconnections have been made, both between United properties alone and between United properties and contiguous systems owned by other companies.

Except in the cases of the larger subsidiaries the United company does not offer to the public the direct obligations of its underlying properties. Some of these direct obligations are outstanding as holdovers from the time previous to United control. In its offerings to the public the holding company puts out its own securities and has about 12,500 holders of its prior preferred stock, which pays $6.36 per share annually.

The operating companies that are owned and controlled by the United Light & Power Company are, so far as is compatible with the economic interests of the group as a whole, locally managed. In order to supply that direction of effort and unity of policy necessary for successful group operation, the holding company has under it another corporation titled the United Light & Power Engineering & Construction Company, which acts as management director of the operating companies. The reason for the separation of the management and holding functions is to avoid the business complexities of the holding company doing business under the laws of many states. The management company does not exercise the same degree of control over all of the holding company properties, there being two large units—Kansas City, Mo., and Columbus, Ohio—the operating and engineering organizations of which can economically be sufficient in numbers and talent to require little management supervision, except in major constructions.

Management Company Acts as Consultant

The conviction of the holding company that its subsidiaries should be locally managed limits the activities of the management company almost to those of a retained consulting engineer, its duties being to exercise a wise supervision over operating practices, which include financing, purchasing, accounting, engineering and construction, legal functions and management policies, to advise as to changes and extensions, and only in the cases of major new constructions or rehabilitations to enter officially and take control of the interests of subsidiaries. The management fee paid by the operating companies covers the work of the management company in its capacity as a retained consultant and fiscal agent; engineering and construction services are billed to the subsidiary on a cost-plus basis.

The subsidiary companies, of course, secure the ad-

vantage of the size and financial connections of the holding company in keeping their costs for new money and refinancing at the minimum.

Organization of Management Company

The functions of the management company cover all phases of the business of the operating company. The organization of the management company is, in fact, almost a typical operating company set-up, with the great difference that the personnel is of much higher business and technical skill than would be possible for any but very large operating companies to employ. These men are selected not only for their business and technical qualifications but also for their ability to guide the affairs of the operating companies tactfully and without friction with the men actually in charge of the local properties.

The management organization chart, here shown, makes plain how the executive personnel of the holding and management companies exercise direction and guidance of the subsidiary companies through the local managers. The specific functions of the officers of the two central organizations are as follows:

Board of Directors—Meets quarterly; matters of policy, financing; approval of construction budget; dividends.

Executive Committee—Meets monthly; same duties as board of directors.

Chairman of Board—Handles financing of company's requirements.

President—Financing; authorization of sub-company expenditures; policies.

Vice-President and General Manager—Supervises operation, engineering, construction, purchasing; sales policy; public policy.

Vice-President and General Counsel — Legal matters, taxes, rate litigation, public policy.

Secretary-Treasurer — Accounting, financing, auditing, financial reports, taxes; distribution of funds required by subsidiary companies.

Group Supervisors — Supervise operation, engineering, construction, management and public relations of properties in certain groups.

Appraisals and Rates—Property records, valuations, rates and rate litigation; handles insurance of sub-companies.

Purchasing—Placing of orders for sub-company material; blanket contracts for all companies covering coal, oil, merchandise, etc.

Engineering and Construction—Covers all phases of engineering, makes plans and specifications, determines economic values, has complete construction forces for major construction jobs, including building.

Manager of Subsidiary Operating Company—All local operations, construction, public policies.

In the various fields of utility management and operation certain definite economies are made possible either by the size of the group included under the holding company control, considered merely as a large financial and commercial organization, or by the fact that, by the distribution of their time and effort over a large number of properties, the services of men of exceptional executive and engineering talent can be made available to these properties.

Size in Itself Makes for Economies

It might be stated that economies in financing and purchasing are attributable to size alone. By the United method of financing, by which the holding company takes the notes of its subsidiaries for money required by them for new construction, extensions and improve-

Examples of Savings Effected in Purchasing Equipment and Supplies

Transformers.—The Lincoln Gas & Electric Company and the Lincoln Traction Company each buys approximately $7,500 worth of transformers (distribution, power and substation type). According to the schedule of discounts, an annual purchase of $7,500 entitles the buyer to a discount of 45 and 5 per cent. The billing discount under the holding company contract with the transformer manufacturer is 48 and 7½ per cent based on a total annual purchase of $15,000 for the two companies. The saving amounts to $1,414.81, or in other words the Lincoln companies would be buying transformers at 9.4 per cent higher prices.

Meters. — The annual purchase of meters amounts to about the same as transformers. Buying separately, the companies are entitled to a discount of 52½ and 4 per cent, which is the discount on purchases less than $10,000 per annum. Buying together, the discounts, according to their contracts, are 55 and 8 per cent, based on a total annual purchase of $15,000 net; the holding company discount shows a saving of $1,607.20, or 10.7 per cent saving over this.

Fire-Fighting Apparatus.—There are no exact figures on the amount of this class of material purchased annually, but it is estimated to be $500 per year for Firefoam, carbon tetrachloride, soda and acid for non-freezing extinguishers and the supplies for refilling the same. The holding company discounts on this material range from 40 to 55 per cent from the retail price and are estimated at 25 per cent better than prices obtained by individual companies. Based on the annual purchase of $500, the saving amounts to $125.

Automobiles.—Based on an annual purchase of $5,000 for trucks and pleasure cars at a discount (estimated average 15 per cent), the annual saving would be $750, or at 18 per cent lower prices.

Malleable-Iron Cast-Steel Fittings, Valves, etc.—On malleable-iron, cast-iron and cast-steel fittings, valves, etc., required for use in the gas departments, power plants, steam lines, etc., the holding company gets a 25 per cent preferential discount from the manufacturers. This class of material, based on an annual purchase of $7,500 at the holding company discount, would show a saving of $2,500 or 33⅓ per cent lower prices.

Insulating Material.—On insulating pipe covering, etc., for power plant, steam main installations, etc., there is an average annual purchase of $1,500. The holding company discount would effect a saving of $150, or 11½ per cent lower prices.

Incandescent Lamps.—Exact figures on the purchase of the Lincoln companies are not available, but judging from the size of the town, net purchases are estimated at $15,000 per year, or $7,500 per company. An annual purchase of $7,500 entitles the purchaser to a discount of 31 per cent. The holding company discount is 39 per cent, or a total saving, based on an annual purchase of $15,000, of $1,943, or 12 per cent lower prices.

Washing Machines.—The saving on washing machines varies from 10 to 15 per cent, or an average of about $10 per washer. Based on an annual purchase of 400 washing machines at $10, the saving amounts to $4,000 per year.

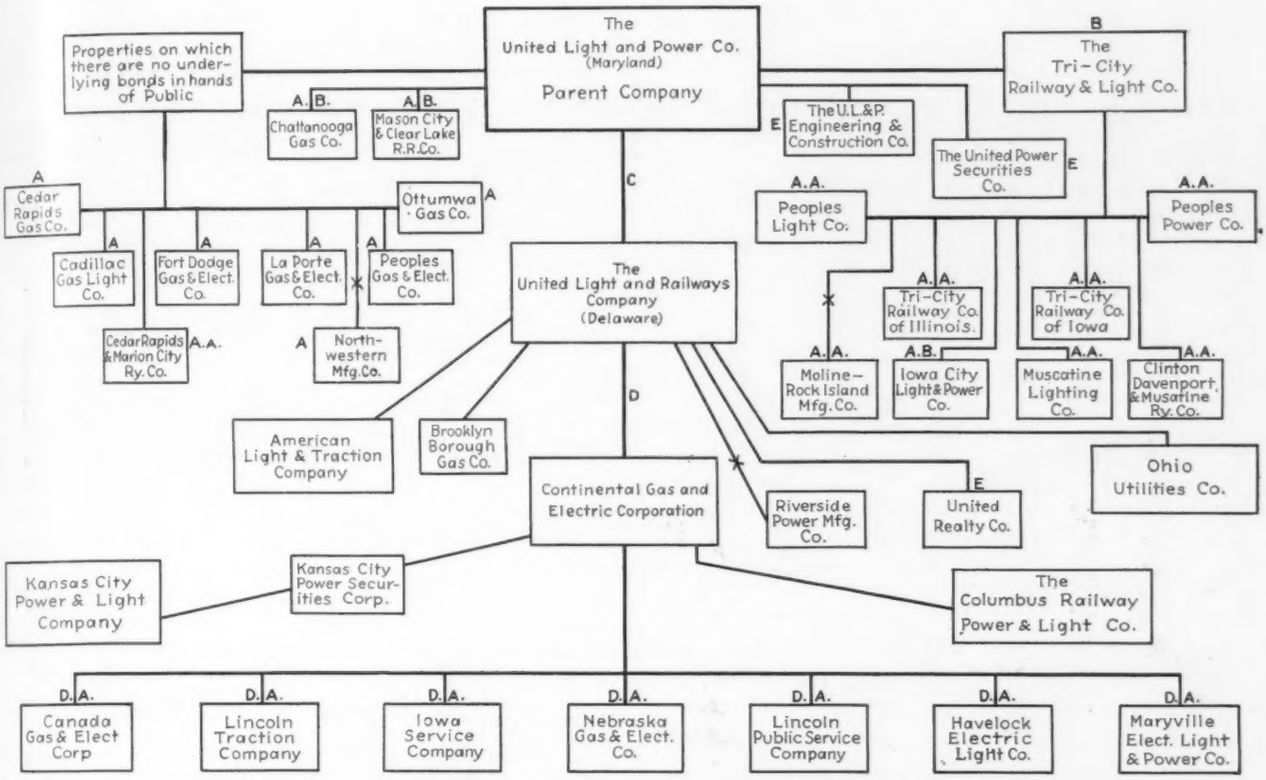
Electric Fans.—Based on an average purchase of 200 fans per year at a saving of 50 cents each, the saving amounts to $100.

Heating Appliances.—Four hundred pieces per annum at an average price of $8 each amount to $3,200; at 5 per cent discount, the saving is $160.

Electric Iron.—A saving of 50 cents each on 600 electric irons amounts to $300.

Thus over a yearly period the total savings are as follows:

Transformers	$1,414.81
Electric meters	1,607.20
Fire-fighting apparatus	125.00
Automobiles	750.00
Malleable-iron, cast-iron fittings, valves, etc.	2,500.00
Insulating material	150.00
Incandescent lamps	1,943.00
Washing machines	4,000.00
Electric fans	100.00
Miscellaneous electric appliances, not including irons	160.00
Irons	300.00
Total	$13,025.01


The United Light and Power Co. (Maryland) Parent Company
Properties on which there are no underlying bonds in hands of Public
A.B. Chattanooga Gas Co.
A.B. Mason City & Clear Lake R.R.Co.
The Tri-City Railway & Light Co.
B
The U.L.&P. Engineering & Construction Co.
E
The United Power Securities Co.
E
A Cedar Rapids Gas Co.
Ottumwa Gas Co. A
C
A.A. Peoples Light Co.
A.A. Peoples Power Co.
A Cadillac Gas Light Co.
A Fort Dodge Gas & Elect. Co.
A La Porte Gas & Elect. Co.
A Peoples Gas & Elect. Co.
The United Light and Railways Company (Delaware)
A.A. Tri-City Railway Co. of Illinois.
A.A. Tri-City Railway Co. of Iowa
Cedar Rapids & Marion City Ry. Co. A.A.
A Northwestern Mfg. Co.
A.A. Moline-Rock Island Mfg. Co.
A.B. Iowa City Light & Power Co.
A.A. Muscatine Lighting Co.
A.A. Clinton Davenport & Musatine Ry. Co.
D
American Light & Traction Company
Brooklyn Borough Gas Co.
Continental Gas and Electric Corporation
Riverside Power Mfg. Co.
E
United Realty Co.
Ohio Utilities Co.
Kansas City Power & Light Company
Kansas City Power Securities Corp.
The Columbus Railway Power & Light Co.
D.A. Canada Gas & Elect Corp
D.A. Lincoln Traction Company
D.A. Iowa Service Company
D.A. Nebraska Gas & Elect. Co.
D.A. Lincoln Public Service Company
D.A. Havelock Electric Light Co.
D.A. Maryville Elect. Light & Power Co.

Relationships of subsidiaries to one another and to the United Light & Power Company

Properties marked *A* are properties on which there are no underlying bonds in hands of the public, and the first and refunding mortgage of the United Light & Power Company is a first mortgage on physical properties, and all securities of the subsidiary companies and all of the securities of these companies are deposited under the lien of the mortgage.

Property marked *AA* is where a very small amount of common stock is still owned by the public but all other securities are deposited under the mortgage of the United Light & Power Company.

Properties marked *AA* are those of the Tri-City Railway & Light Company, which have no funded debt in the hands of the public, and all of whose securities are deposited under the lien of the Tri-City Railway & Light Company first and refunding mortgage.

Property marked *AB* is that on which there is a small mortgage debt in hands of the public, but otherwise all of the securities are deposited under the lien of the Tri-City Railway & Light Company mortgage or that of the United Light & Power Company.

Property marked *B* is the Tri-City Railway & Light Company, of which all but 0.8 per cent of the common stock is owned by the United Light & Power Company and which has outstanding in hands of the public but $4,201,000 of funded debt and $1,444,200 of 6 per cent preferred stock.

Property marked *C* is the United Light & Railways Company, which has outstanding no funded debt, but has $7,250,000 face amount of preferred stock in hands of public. All of the common stock of this company, amounting to $29,130,600, is owned by the United Light & Power Company. Against this stock there are no liens and the United Light & Railways Company securities are not subject to the mortgage of the parent company. This company in turn owns all, or practically all, of the common stocks of the Continental Gas & Electric Corporation, the Brooklyn Borough Gas Company, the Riverside Power Manufacturing Company, the United Realty Company and the Ohio Utilities Company, and also large holdings of common stock of the American Light & Traction Company.

Property marked *D* is the Continental Gas & Electric Corporation, which in turn owns all of the stock, preferred and common, of the companies marked *DA*, only two of which have any mortgage debt—namely, the Lincoln Gas & Electric Company, $1,500,000, and the Lincoln Light, Heat & Power Company, $1,500,000. The Continental Gas & Electric Corporation also owns all of the common stock and preferred stock of the Kansas City Power Securities Corporation, which in turn owns all of the common stock of the Kansas City Power & Light Company. It also owns practically all of the common stock and a large amount of the preferred stock of the Columbus Railway, Power & Light Company.

Properties marked *E*—all of the stock of these companies, which have no funded debt, is owned by the United Light & Power Company and/or the United Light & Railways Company. These companies, composing the United Light & Power Engineering & Construction Company and the United Realty Company, are departmental companies through which the United Light & Power Company operates its properties, sells its securities and owns certain office buildings, on which there is no debt.

The Riverside Power Manufacturing Company and the Northwestern Manufacturing Company own generating stations favorably situated on which there is no mortgage debt and which are not public utilities—wholesaling power only to public utility companies. These are designated by *X* on the chart.

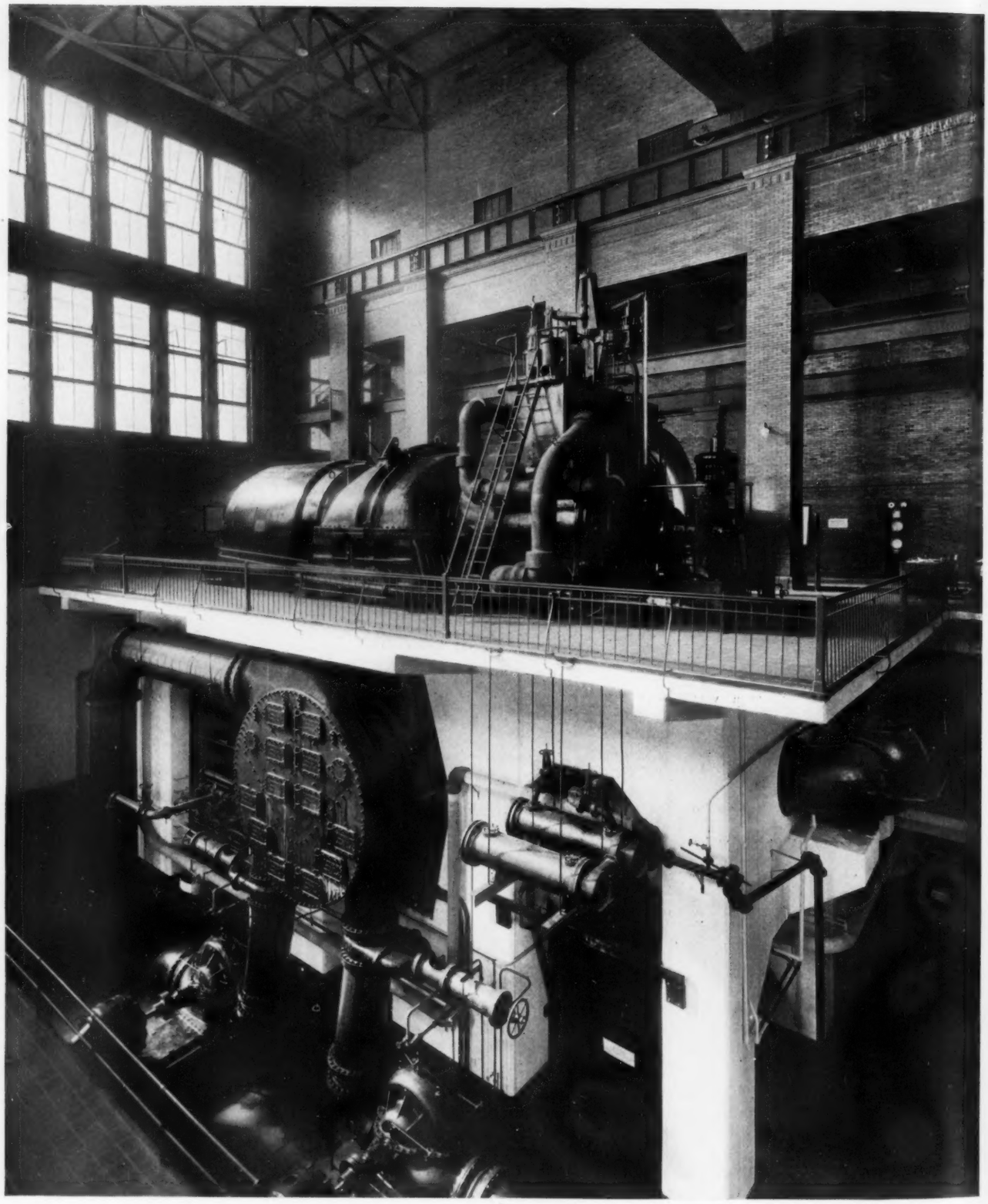
ments, the subsidiaries are enabled to profit by the time diversity of their financial demands in exactly the same way that a large total of non-coincident electrical demands may be served from a comparatively small transformer. Also, the holding company, having as its financial foundation the physical properties of the subsidiaries, can obtain money at the low rates concomitant with its large borrowing power. These low rates are directly profitable to the operating companies and would not be available to them if they entered the financial market as independent units.

Purchasing Economies Obtained

As instancing the economies in purchasing, here is a typical case. Before the properties were taken over by the holding company, the city of Lincoln, Neb., was served by two competing electric utilities. For the purpose of comparison a part of the average annual material and equipment requirements of these two companies has been set up to show costs with and without holding company discounts. The parallel brings out clearly the savings effected through the combined buying power of the larger organization. (See page 1152.)

The above does not represent all the advantages in the way of buying. Ordinarily neither of the Lincoln companies would buy wire in carloads unless some unusual extension were contemplated, but by combining the Lincoln requirements with the requirements of other Nebraska properties, wire can be bought in carload lots, and the companies not only have the advantage of the carload freight rate but buy at lower prices per pound—probably one-half cent per pound plus the saving on the freight.

As far as poles are concerned, the annual purchases



Interior of plant of
Riverside Power Manufacturing Company, Davenport, Iowa,
25,000-kw. turbo-generator

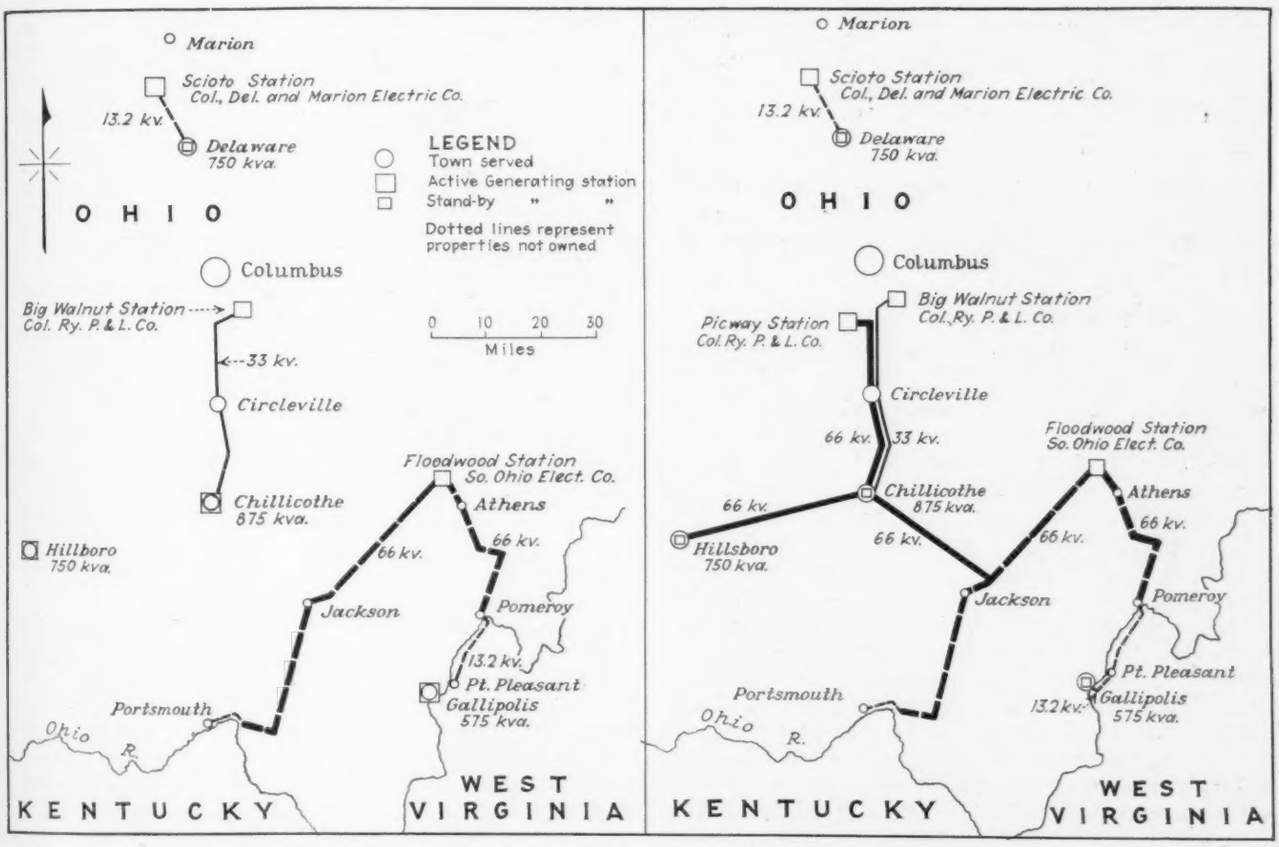
of the holding company for all properties amount to nearly $200,000, whereas the requirements of the Lincoln properties amount to only three or four cars. The holding company is doubtless able to buy poles more cheaply than could a company that bought only a car or two per year.

In this connection there is the fact that the advantages outlined do not in every case ultimately benefit the operating company. In the case of material bought for resale, the general practice is to mark the material up a certain percent so that the customer is the one who benefits. This is not true in cases where resale prices are established by the manufacturer. Also on material such as transformers, meters, etc., purchased for plant account, it means simply that the operating company has a smaller plant account. The saving is in the last analysis reflected in rates, since they are based on capital account.

seen that the Lincoln Gas & Electric Company has been relieved of this expense as follows:

Purchasing agent	$150 per month
Stenographer (half time)	50 per month
Other assistance	100 per month
Office space	25 per month
	$325 per month
or	$3,900 per year

It is to be remembered that the purchasing economies recited here are only a partial statement of conditions on one subsidiary property. Let the total figure of nearly $17,000 annually be increased once to cover fully the operations of the subsidiary and then be multiplied many times to arrive at an idea of the purchasing economies in the entire holding company group.



System of Ohio Utilities Company before and after coming under holding company control

Consolidation of Purchasing Departments Reduces Expenses

There is also to be considered the elimination of the purchasing department of one of the two operating companies at Lincoln. The Lincoln Gas & Electric Light Company formerly maintained a purchasing department and had a purchasing agent at a salary of $150 per month. The department also had stenographic assistance—probably 50 per cent of the stenographer's time—and the assistance of the chief engineer and superintendents, in buying power plant and special apparatus, whose time might be calculated at $100 per month. It also occupied office space, which might be considered at $25 per month. It is therefore readily

It has been earlier stated that the engineering talent of the United Light & Power Engineering & Construction Company was continuously at the disposal of the subsidiary companies. If one of these subsidiaries were independent and found itself faced with a major construction project, it would, lacking in its own organization competent engineering experience and skill, engage some outside engineering firm for the work. It can be readily seen how the holding company engineering staff can function for subsidiary companies almost exactly as an engineering firm would for an independent company, with the notable difference that the cost to the subsidiary would be much less. This is on account of the fact that an outside engineering firm must, of necessity, make provision for the ups and downs of business by making comparatively high charges for its work.

But there is another service rendered by the holding

company engineering staff that is not normally available to an independent utility. This is the continuous supervision over its operations and minor constructions, which results in savings, perhaps small in themselves, but aggregating a respectable total at the end of the year. As instancing these almost routine economies, there is here presented a comparison of cost of two substations built by independent companies shortly before they came into the holding company group with the standard substations that would have been built afterward:

Cost of Villisca substation	$9,628.61
Total kilowatt-hours sold in 1925	248,610
Carrying charge on substation investment at 15 per cent	$1,444.29
Investment charge per kilowatt-hour ($1,444.29 ÷ 248,610)	$0.0058
Cost of new style substation	$4,372.68
Carrying charge at 15 per cent	$655.89
Investment charge per kilowatt-hour ($665.89 ÷ 248,610)	$0.00264
Cost of Hampton station	$7,278.39
Carrying charge at 15 per cent	1,091.76
Total kilowatt-hours sales	120,821
Investment charge per kilowatt-hour ($1,091.76 ÷ 120,821)	$0.00904
Cost of new style substation	$4,372.68
Carrying charge at 15 per cent	$655.89
Investment charge per kilowatt-hour ($655.89 ÷ 120,821)	$0.00543
Substation capacity	225 to 300 kw.

It may be noted that in one case the substation itself added nearly 3 mills to the cost of a killowatt-hour and that in the other the added investment charge was more than 3 mills.

Example of Operating Economies

A particularly good example of reduction in operating costs is supplied by the city of Lincoln, Neb., with about 60,000 population. This city was served by two competing utilities both of which were taken over by the United Power & Light Company. Parenthetically, it is interesting to note the generating equipment in the plants of these companies and to know that some of this equipment, being obsolete and inefficient, would have had to be replaced if another holding company economy —purchase of power—had not been accomplished. Preceding the list of equipment, given in Table I, is a comparative detail of operating data and costs. The first column of figures shows the combined costs of the two taken from actual operating records. The second column shows the estimated figures for operating the plants together with a 2,300-volt tie line constructed between the two plants. The plants have not been in operation long enough under the new conditions to accumulate definite typical figures to be stated as averages of a year, but the records of the few months since the consolidation indicate that the estimated figures not only will be reached but will be bettered.

Savings from Interconnecting Properties

The two maps of the Ohio Utilities Company system show what has been done in this case by centralized control in the way of interconnection. Bringing the scattered units of this system into one whole has resulted in reduced electricity rates to many customers. The first map shows the system in 1924, before the United Power & Light Company had gained control, and the second shows the system in 1927, after the holding company had operated the property for a little longer than a year.

Under the old régime small and inefficient generating stations were operated in the cities of Hillsboro, Chillicothe and Gallipolis. Chillicothe was connected to another source of electricity supply, but with a small line of comparatively low transmission voltage. The growth

Table I—Example of Operating Economies Secured by Holding Company Control

	Old Condition	New Condition
Fuel Data:		
Total tons coal used	79,052.39	58,130.00
Cost per ton	$4.70	$4.70
Cost fuel	$371,546.23	$273,211.00
Handling cost at 20 cents per ton	$15,810.48	$11,626.00
Total cost fuel ready for use	$387,356.71	$284,837.00
Total cost fuel per ton	$4.90	$4.90
Boiler Room Data:		
Thousands of pounds water evaporated	1,106,559	820,600
Pounds water per pound coal	6.97	7.05
Total boiler room expense	$72,798.96	$52,800.00
Total cost steam	$460,155.67	$337,637.00
Cost steam per 1,000 lb	$0.418	$0.412
Engine Room Data:		
Kilowatt-hours generated, net	37,224,542	37,224,542
Pounds water per kilowatt-hour	29.60	22.00
Pounds coal per kilowatt-hour	4.24	3.12
Total engine room expense	$71,184.02	$47,500.00
Total reduction expense	$531,339.69	$385,137.00
Charged to steam heat	$41,097.53	$41,097.53
Charged to gas plant	$19,030.42	$19,030.42
Charged to construction	$5,995.94	$5,995.94
Net electricity production expense	$465,215.80	$319,013.11
Switchboard cost per kilowatt-hour	$0.01250	$0.00857
Fixed Charges, etc.:		
Tieline, 18 per cent on $22,000	.....	$4,000
Operation tie line, 2 per cent loss	.....	$3,000
Totals:		
Total net electricity production expense	$465,215.80	$326,013.11
Total switchboard cost per kilowatt-hour	$0.01250	$0.00876

Equipment—Lincoln Traction Company:
4,000-kw. turbine
1,500-kw. turbine
1,000-kw. turbine
500-kw. turbine
500-kw. Corliss engine
325-kw. Corliss engine
Three 500-kw. Diesel engines

Equipment—Lincoln Gas & Electric Company:
5,000-kw. turbine
3,000-kw. turbine
1,500-kw. turbine
500-kw. turbine
Total capacity, 18,875 kw.

of electric service in these towns was hampered, if not prevented entirely, by the fact that the generating plants were of low capacity, and supply from other sources was lacking or limited and not wholly dependable.

By the construction of 66,000-volt lines as shown on the second map service of adequate capacity and unquestioned reliability was made available to the system from the Big Walnut and the new Picway stations of the Columbus Railway, Power & Light Company and the Floodwood station of the Southern Ohio Electric Company. This interconnection has benefited not only the Ohio Utilities system but also the companies owning the generating plants by permitting them to make operating economies through the interchange of power. The construction of the 66,000-volt line permitted the shutting down of the small plants at Hillsboro and Chillicothe, and a short length of 13,200-volt line from Point Pleasant allowed the Gallipolis plant to be retired.

The three tabulations presented here show the effect of holding company management. Substantial rate reductions were made in Chillicothe, Circleville, Gallipolis and Delaware. The reduction in Delaware was not made until Jan. 5, 1927, and its effect is not shown in the tabulation.

Apparently in spite of the reduced rates, but more probably actually because of them, the gross receipts from lighting increased from $396,000 in 1924 to $422,000 in 1926, the average rate per kilowatt-hour dropping from 10.46 to 8.77 cents. As may be noted in the table, the power business has almost trebled, due to the fact that, with a strong holding company and an interconnected system behind it, the operating company could guarantee to power consumers requiring uninterrupted supply that this service reliability would be given. The operating company, in its previous indepen-

dence, could not supply this class of service, and the bulk of this kind of business was unobtainable under the conditions then existing. The full benefit of the new transmission lines and diversified power supply sources in regard to power business is not reflected in the tabulations. For example, one large power consumer in Chillicothe, a paper mill, began to take energy in January, 1927, and at least one more paper mill will be on the lines by the middle of 1927.

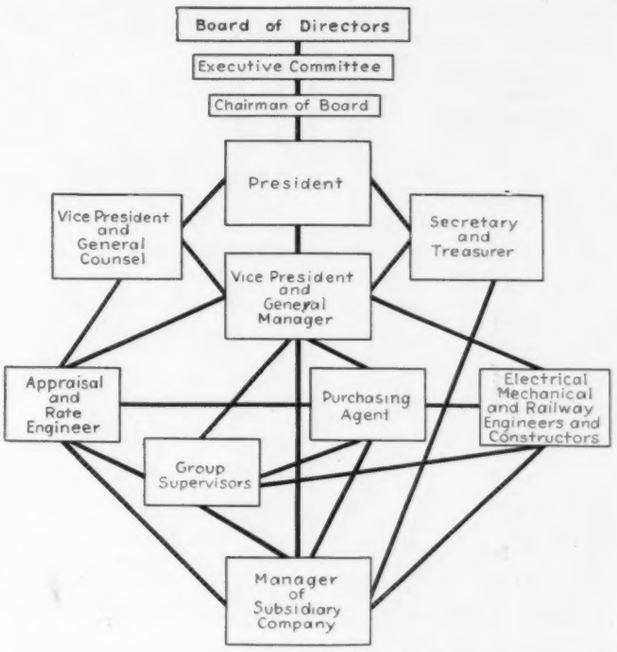
It is interesting to note, from Table III, as confuting the impression that big business is necessarily predatory business, that net earnings per kilowatt-hour were

Table II—Customer Growth with Holding Company Control—The Ohio Utilities Company

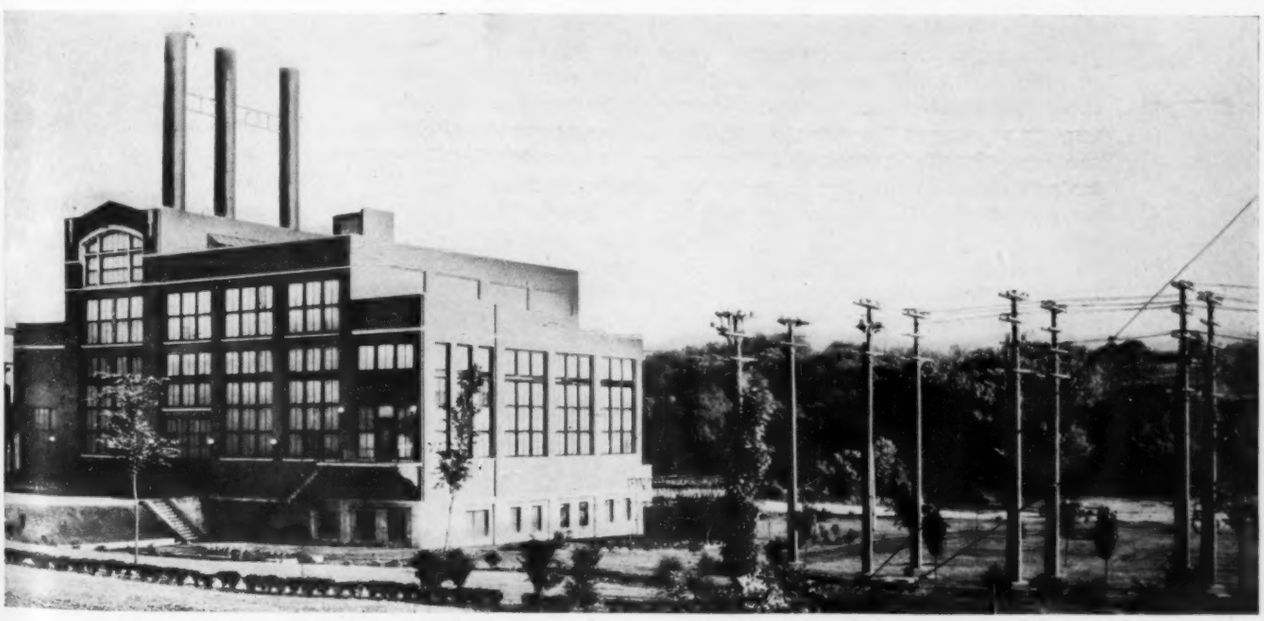
	Dec. 31, 1924		Dec. 31, 1926
Population (1920 census):			
Delaware	8,756		
Circleville	7,049		
Chillicothe	15,831		
Hillsboro	4,356		
Gallipolis	6,070		
Customers—Lighting:			
Delaware	2,023		2,363
Circleville	1,851		1,830
Chillicothe	3,034		3,582
Hillsboro	1,220	(approx.)	1,324
Gallipolis	793		989
Total light customers	8,921		10,088
Customers—Power:			
Delaware	91		113
Circleville	97		85
Chillicothe	77		90
Hillsboro	45	(approx.)	67
Gallipolis	34		53
Transmission division (foreign customers)	3		4
	347		412
Total all customers	9,268		10,500

higher before the holding company took over the system. Centralized management effected economies reflected in the difference of 1.29 cents per kilowatt-hour in operating expense for 1924 and 1926. This economy, and more, is passed on to the consumer, as is shown by the difference of 2.44 cents in gross income per kilowatt-hour for 1924 and 1926.

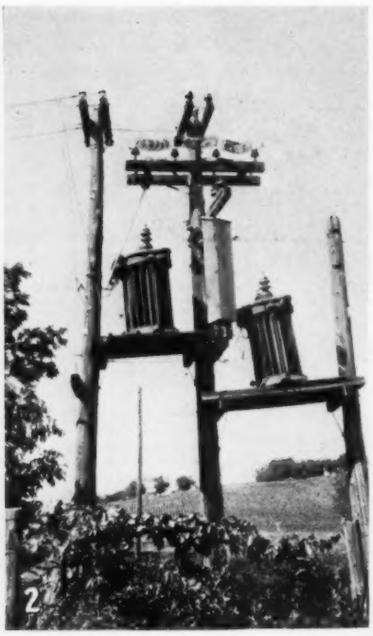
Another case of savings made through interconnection is instanced in the case of the western group of properties shown on the map. These properties had need of about 21,000,000 kw.-hr. per year to care for increasing business. Without interconnection of the properties in the group this new business would never have been taken on the lines, or else a number of small and therefore inefficient plant extensions would have been necessary. With the group tied together, however, the increase could have been taken care of by the installation of a new turbine at Lincoln and the purchase of some power from outside sources. If the group had not been under holding company control, this is undoubtedly what would have been done in spite of the facts that water supply for condensing is almost non-existent

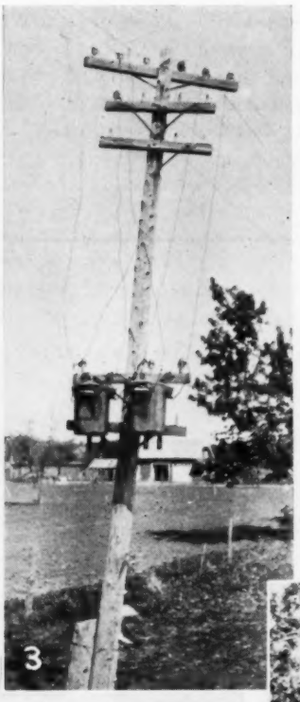


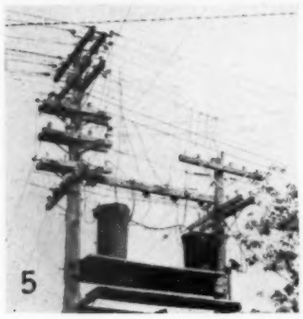
Management functions of the United Light & Power Company

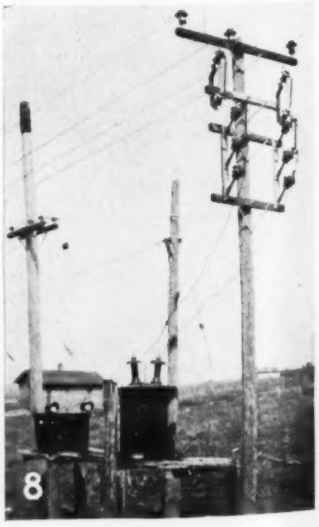


A factor in public relations. Landscaped grounds of the plant of the Northwestern Manufacturing Company at Fort Dodge, Iowa









Taking Things as They Are Found— And Changing Them

THERE are three major considerations in overhead line construction—safety, service continuity and economy. Aside from the benefits of standardization of practice brought about by holding company operation of small electric utilities in the latter two considerations, there can be no doubt that improvements in the most important item of the three, safety, have actually saved the lives of many linemen and others who, if these illustrated conditions had remained, would now be swelling the heavenly choir. A lineman, working on these poles, well might pray, "Protect me, O Lord, from the sins of other men." Tottering poles, low sagging wires, mazes of leads aimlessly going nowhere and defective insulation are signs of poorly managed small-town utilities lacking money for maintenance.

No. 1. A cable pole minus the cable. Rubber-covered output leads from a power house carried underground and up the pole in an iron pipe. Insulation abraded and worn and pipe rusted through in spots. One of the reasons why the lights went out so often.

No. 2. A village depended on this substation for service. Note the insulator on the end of the stick tied to the casing of the higher transformer.

No. 3. The supply of insulators was exhausted when the primary leads were dropped.

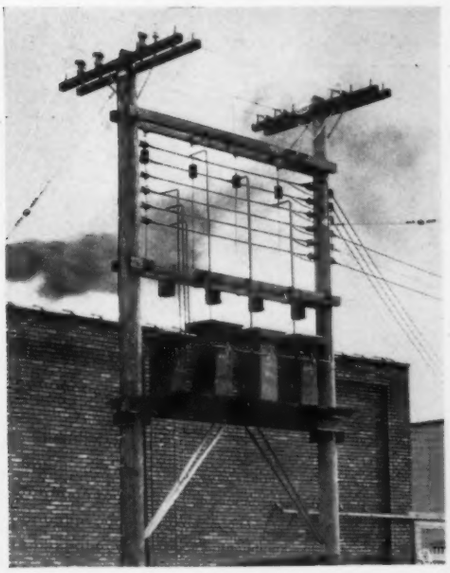
No. 4. Linemen are expected to climb poles like these.

No. 5. A good reason why insurance companies class line work as a hazardous occupation.

No. 6. A study in sags. A sagging company spirit was probably the cause of this.

No. 7. A happy independence of rule and reason inspired this.

No. 8. The picture does not show the fence of fine wire around this substation. That is the best that can be said of it, it has a fence around it.



Good design and good workmanship characterize overhead construction on central management properties

at Lincoln and the new turbine installation would have been very expensive.

Knowing that the Nebraska Power Company had energy to sell, the holding company set up the problem of supplying this requirement of 21,000,000 kw.-hr. in two proposals, the first including a new turbine at Lincoln and the purchase of two power blocks of 3,000,000 kw.-hr. each from the Central Power Company at Grand Island, Neb., and from the Citizens Gas & Electric Company at Council Bluffs, the second the same as the first except that purchase of 15,000,000 kw.-hr. from the Nebraska Power Company at Plattsmouth took the place of the new turbine. The second proposition, as is shown in Table V, was patently the more economical and it was adopted. Note that the difference between the two propositions figures out to nearly 4 mills per kilowatt-hour.

Table III—Business Changes with Holding Company Operation—The Ohio Utilities Company

	Year 1924			Year 1926		
Electric Sales	Kw.-Hr.	Money	Ave. Rate, Cents per Kw.-Hr.	Kw.-Hr.	Money	Ave. Rate, Cents per Kw.-Hr.
Lighting	3,784,447	$396,002	10.46	4,813,425	$422,422	8.77
Street lighting	910,270	46,846	5.15	995,444	48,044	4.82
Power	2,207,847	124,213	5.63	5,943,861	181,541	3.06
Other utilities	394,437	9,861	2.50	1,033,244	14,132	1.38
Camp Sherman	655,960	18,039	2.75	538,770	12,913	2.40
Total sales	7,952,961	$594,961	7.48	13,324,844	$679,052	5.09
Other electric income		7,062			5,749	
Gross income		$602,023	7.57		$684,801	5.13
Operating expense (less taxes)		327,949	4.13		378,105	2.84
Net earnings before taxes		$274,074	3.44		$306,696	2.29

	Per Cent
Net decrease in average rate	31.6
Net increase in sales, kilowatt-hours	67.5
Net increase in gross revenue	14.2
Net increase in net earnings	12.0

Kilowatt-hour sales per meter:

	Year 1924	Year 1926
Lighting	425	476
Total	855	1,270

Indicating the extent to which interconnection has been effected among United Light & Power Company properties and with other utility systems is the number of plants that have been closed down as properties came into holding company control. This number is 43. Of these, ten have been retained in condition to run if emergency requires.

Handling Public Relations Locally Without Interference by Holding Company

The United Light & Power Company believes that its subsidiary properties enjoy good public relations. One factor contributing to this belief is the policy of the holding company to make local managers managers in fact as well as name. So far as the destinies of his company are concerned the local manager is responsible; he is not merely a rubber stamp. The people of his community know him as a man with authority to make decisions and they know that their local problems are up to the man they see, are not referred by him to distant and formidable powers that have no contact and therefore no sympathy with the conditions confronting them.

Another factor is the promptness with which the holding company, secure in the knowledge of the economies it can produce, usually reduces rates. Character of service is another factor. Both of these are exem-

Table IV—Revenue in Cents Per Kilowatt-Hour Sold, Before and After Rate Reductions Made by Holding Company—The Ohio Utilities Company

	All		Lighting		Power	
	Year 1924	Year 1926	Year 1924	Year 1926	Year 1924	Year 1926
Chillicothe	7.304	5.45	10.25	7.53	5.4	4.26
(Reduced Sept 1, 1925)	Dec., 1925	Dec., 1926	Dec., 1925	Dec., 1926	Dec., 1925	Dec., 1926
Circleville	8.45	7.84	9.5	8.35	6.9	7.5
Gallipolis	7.47	7.24	9.09	8.60	6.0	6.09
Delaware	7.82	7.765	9.69	9.71	5.51	5.12

(Rate reduction effective Jan. 5, 1927)

Table V—Analysis of Savings from Interconnection

	21,000,000 Kw.-Hr., Purchase and Generate	21,000,000 Kw.-Hr., Purchase All
Total Investment Required		
Transmission lines (sheet A)	.....	$576,950.00
Transmission lines (sheet C)	$540,206.00	.....
Substations (sheet B)	149,250.00	149,250.00
New turbine at Lincoln	428,007.50	.....
Total investment	$1,127,457.50	$726,200.00
Saving in plant investment at Norfolk as per 1926 budget	64,000.00	64,000.00
Net investment required	$1,063,457.50	$662,200.00
Difference in favor of purchased Power from Nebraska Power Company	.....	$401,257.50
Carrying charges at 13½ per cent on above saving in investment required	.....	54,168.41
Proportion of above net investments allocated to changes on transmission lines and substations necessary to distribute 21,000,000 kw.-hr. additional energy	371,350.00	408,100.00
Carrying charges at 13½ per cent	$50,132.50	$55,093.50
Total cost of energy delivered to system (21,000,000 kw.-hr. at $0.011825)	.....	248,325.00
Total cost of energy delivered to system (21,000,000 kw.-hr. at $0.013315)	279,615.00	.....
Total annual energy cost	$329,747.50	$303,418.50
Difference in favor of purchased power from Nebraska Power Company	.....	$26,329.00
Saving in investment charges	.....	54,168.41
Net saving in dollars per year, Nebraska Power Company, consisting of saving in energy cost based on 21,000,000 kw.-hr. together with reduction of fixed charges required, in favor of purchased power	.....	$80,497.41

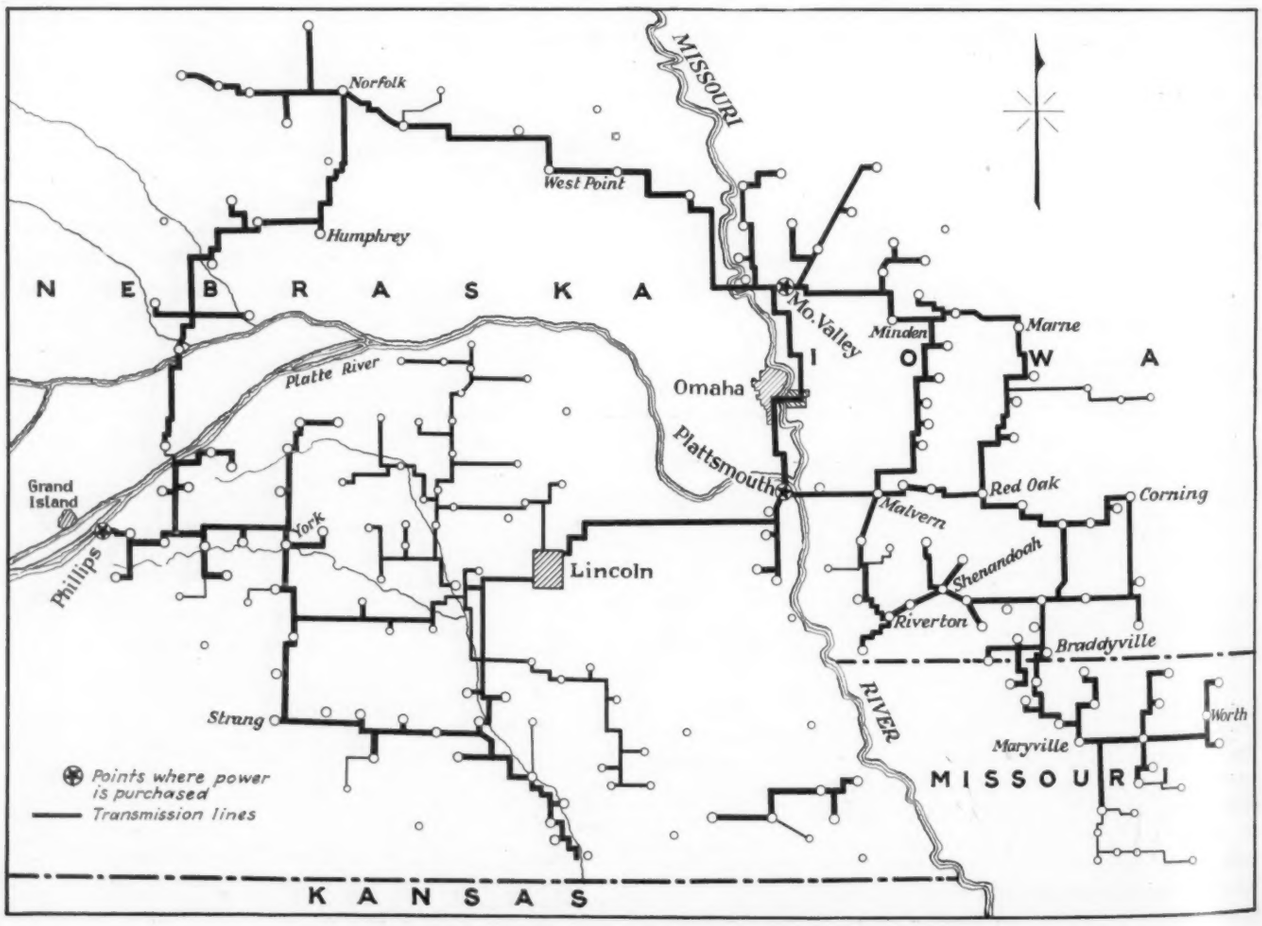
plified in the case of the Ohio Utilities Company and are evidenced by the increase which has occurred in energy consumption and the remarkable growth of the power load.

Among the most outstanding contributions of centralized management to electric utility operations throughout the United States has been the improvement in distribution systems. Local companies, particularly those serving villages and small towns, hampered by lack of money and lack of engineering skill, have often permitted their distribution lines to become not only major reasons for very bad service but actually criminal menaces to life and property. Instances of little or no maintenance, poor construction and engineering ineptitude abound.

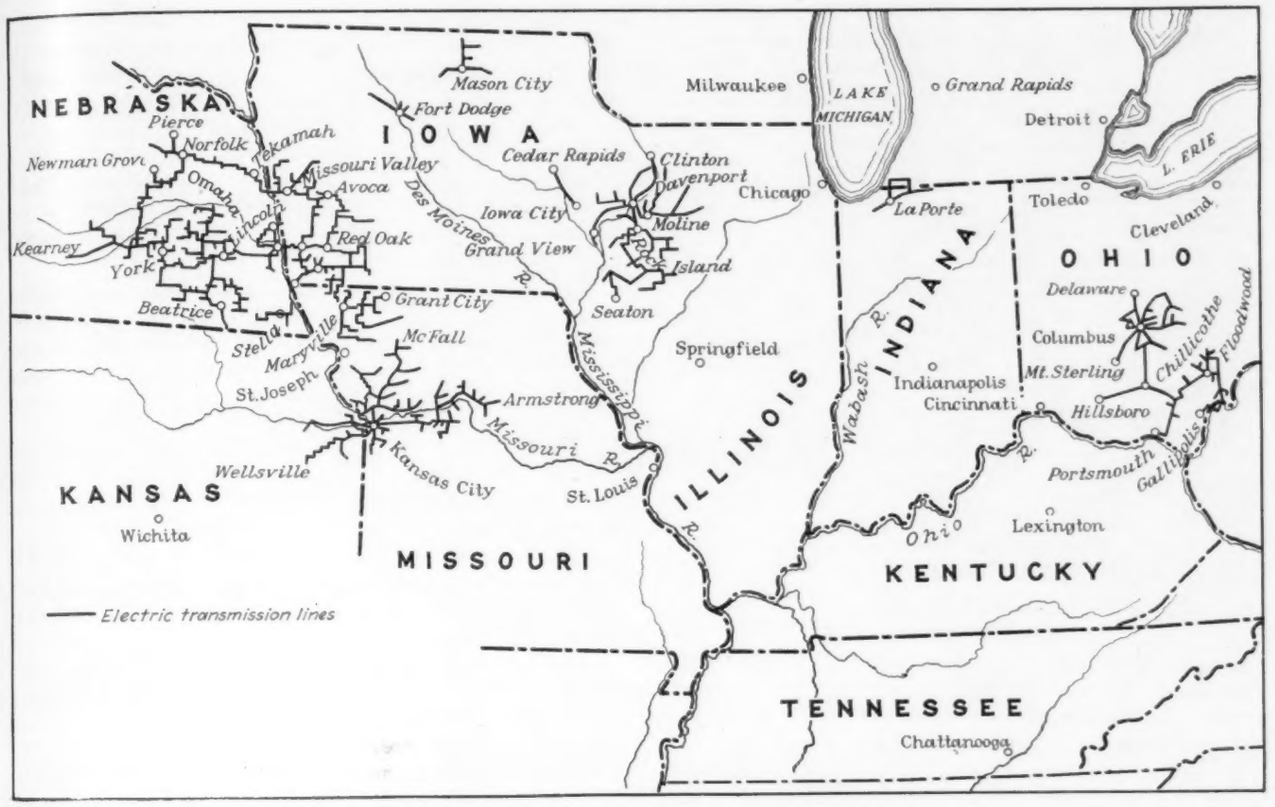
The mass of detail included in any exhaustive study of a distribution system prevents the presentation of a complete example here. However, there are certain definite considerations that can be briefly stated and will serve as an indication of how competent engineering may afford large economies.

It was earlier said that before it was taken into the system of the United Light & Power Company the city of Lincoln, Neb., was served by two competing electric utilities. For this reason there was much duplication of overhead construction, adding that economic burden to the usual bad condition. Leaving out of consideration the secondary conductors and taking the primaries alone, the line losses were very high. By replacing the duplicating systems, both operating at 2,300 volts, with a single 4,000-volt system, some very striking savings were made.

Previous to the consolidation the annual energy line losses on primary feeders and mains of one company totaled 910,500 kw.-hr. and for the other 1,078,000 kw.-hr. These are line losses only; they do not include transformer, meter shunt and miscellaneous losses.



Systems benefited by purchasing power from Nebraska Power Company



Service areas of United Light & Power Company

The sum of these losses, 1,988,500 kw.-hr., at 1 cent per kilowatt-hour was costing the two companies $19,885 per year. Line losses are, however, always present in any system; they cannot be abolished, but they can in many cases be reduced. The reduction was accomplished in Lincoln by rebuilding the distribution systems for 4,000 volts and eliminating duplications. This resulted in a saving of 1,847,220 kw.-hr. per year, a saving of 93 per cent, as shown in Table VI.

Table VI—How an Improved Distribution System Reduced Losses

Company	Type of Circuit	Total Losses, Old 2,300-Volt System, Kw.-Hr.	Ratio of Losses Old 2,300-Volt System to New 4,000-Volt Four-Wire System	Losses in Kw.-Hr., New Four-Wire System
No. 1	Single phase	801,500	13	61,600
No. 1	Three phase	109,500	4.53	23,860
No. 2	Single phase	121,000	28	4,180
No. 2	Three phase	957,000	18.5	51,700
Total		1,988,500		141,280

Total annual losses, 2,300-volt system, kw.-hr.	1,988,560
Total annual losses, 4,000-volt, four-wire system, kw.-hr.	141,280
Total annual saving of the new 4,000-volt, four-wire, star-connected system over the present 2,300-volt, three-wire system, kw.-hr.	1,847,220
Total annual saving of 1,847,220 kw.-hr. at $0.01 per kilowatt-hour.	$18,472
The above annual saving capitalized at 15 per cent	$123,140

Sales Supervised and Accelerated

In the organization of the United Light & Power Engineering & Construction Company there is a man who for lack of any other title might be called general sales supervisor. It is the duty of this man to keep in constant touch with the sales departments of the subsidiary companies except Columbus and Kansas City, which have large sales organizations of their own, and to advise them in their conduct of energy and merchandise sales. His formal contacts with the subsidiaries are through the local managers. Each property sends to him each month an itemized report of all sales, both gas and electric, in which is detailed all data affecting the sales department. From this report he learns how many appliances have been sold and for how much, costs covering salaries, demonstrations, advertising, connections, etc., rate classifications in which sales were made and amounts—all the information relevant to the subject. These reports cover the current month this year and last year and the totals to date for the two years.

Table VII—Distribution of Kilowatt-Hours Sold on Three Properties

Kw.-Hr. Sales	1923	1924	1925	1926
Iowa Service Company				
Lighting	3,912,714	4,172,263	4,579,247	5,072,796
Power	2,119,721	1,974,999	2,017,098	2,464,308
Municipal street lighting	547,344	666,926	655,438	683,406
Municipal pumping	411,293	438,620	608,823	611,783
Cooking	485,211	532,522	593,086	762,175
Total sales	7,476,283	7,719,330	8,453,692	9,594,462
Total sales per meter	479	469	518	583
Total number of meters	15,607	16,448	16,303	16,448
Nebraska Gas & Electric Company				
Lighting	4,552,655	5,004,194	5,322,462	6,590,274
Power	2,462,620	2,430,875	2,992,356	3,590,199
Municipal street lighting	724,960	666,070	700,438	707,590
Municipal pumping	428,256	478,444	558,209	648,719
Cooking	171,417	242,143	348,538	534,358
Total sales	8,339,908	8,821,726	9,922,003	12,071,140
Total sales per meter	457	491	544	640
Total number of meters	18,257	17,973	18,234	18,846
Maryville Electric Light & Power Company				
Lighting	814,658	891,569	982,368	1,087,044
Power	283,421	315,932	332,078	387,322
Municipal street lighting	193,913	198,432	218,657	237,020
Municipal pumping	197,408	92,686	174,504	185,214
Cooking	133,642	130,363	140,084	192,811
Total sales	1,623,042	1,628,982	1,847,691	2,089,411
Sales per meter	485	445	500	554
Total number of meters	3,343	3,663	3,695	3,774

Table VIII—Appliance Sales Per Customer Doubled in Two Years

Iowa Service Company, Maryville Electric Light & Power Company and Nebraska Gas & Electric Company

	1924	1925	1926
1 Electric appliance sales	$159,962.80	$242,498.60	$300,924.63
2 Per cent gross profit	28	25.5	24.5
3 Per cent salaries and commissions	17	12.8	15
4 Per cent advertising and demonstrations	4	4.1	2.8
5 Per cent miscellaneous expense	4	3.1	**5.6
6 Total appliance sales expense	23	20	23.4
7 Net profit	$7,422.74	$13,492.10	$3,457.50
8 Per cent net profit	4.6	5.5	1.1
9 Per cent net return on investment	7	22.3	3.3
10 Average stock	$105,037.83	$60,510.00	$100,886.03
11 Stock turnovers	1.5	4.	2.7
12 Electric meters gained	871	2,530	474
*14 Electric appliance sales per residence meter	$5.03	$8.07	$10.03
16 Electric ranges	....	214	372
17 Electric water heaters	....	17	18
18 Electric appliances	574	1,017	1,810
19 Electric irons	489	905	813
20 Electric washers	697	857	976
21 Electric cleaners	152	194	461
22 Electric refrigeration	....	....	56
23 Electric ironers	....	....	9

Note: 1926 figures are on appliances only, due to accounting changes; 1924 and 1925 included all sales.
* Eight months' operation in 1925 on United Light basis.
* Assume 25 per cent of meters not in dwellings.
** Caused by store-room chargers not charged in previous year.

The same form is used by all properties. With these report sheets the sales supervisor can make comparisons between periods and between companies. He is thus able to judge where his advice and help are needed.

At intervals determined by the arising of new conditions the managers of local companies are brought together for discussion of policies and practices relating to sales departments. These discussions are for the purpose of bringing all of the companies into agreement and to prevent the natural tendency to divergence from having too large an effect. At these meetings such subjects as the manager's place in promoting new business, sales department organization, compensation of salesmen, selection of appliances, reports and records and co-operation and co-ordination through the engineering and construction company are considered.

Table VII shows the distribution of energy sales on three properties of the United Light & Power Company. The per cent figures of sales per meter and of numbers of meters based on 1923 would not be strikingly out of line with average growth, but comparison of energy sales for lighting and cooking show steady and large increases, which indicates that a good selling job is being done to domestic customers. This indication is again apparent in Table VIII, which shows that there has been a doubling of appliance sales per customer in two years.

ADVERTISING SERVICE RENDERED BY HOLDING COMPANY

Among the services rendered to subsidiaries by the United Light & Power Engineering & Construction Company is advertising. This department is in the same relation to operating companies as an outside agency would be. It furnishes copy, mats and cuts on request, but never tells local managers what media to use nor makes direct contact with these media. A manager will make all arrangements as to space and rates with the local newspapers and so far as the newspapers are concerned the manager is the company. This policy has a powerful influence on public relations for the newspapers still remain molders of public opinion, more so in small communities than in large cities.

The advertising department also has other duties, which include publication of employee organs and preparation of publicity matter, which is distributed with dividend checks to stockholders each month and through other channels.

Letters from Our Readers

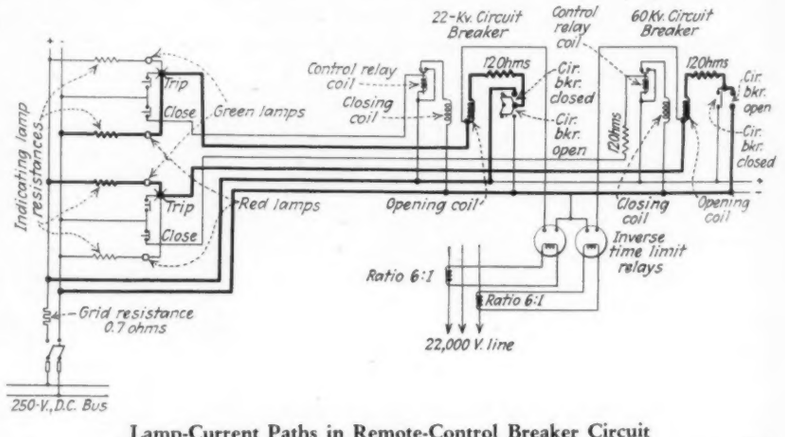
Says Circuit Is Correct

To the Editor of the ELECTRICAL WORLD:

In the drawing illustrating the description of a control circuit contributed by the writer to the ELECTRICAL WORLD of April 16 last (page 816), there were two errors, as noted on the accompanying drawing. These were made in preparing the copy for publication and consisted in the omission of wire connections at the points indicated.

Another error was apparently discovered by the readers of the article, but this error was in the discovery, not in the drawing. It was pointed out by the critics that the red and green indicating lamps were permanently connected in series. This is true and it might be a rather deleterious condition if it were not for the fact that the connection point between the lamps is positive or negative as the particular breaker is closed or open.

Both of the lamps are energized through the opening coil of the breaker, thus introducing the very desirable feature into the circuit that the lamps furnish a continuous check on the opening coil. It is obvious, of course, that the current taken by the lighted lamp is not sufficient to operate the breaker.



Lamp-Current Paths in Remote-Control Breaker Circuit
As the drawing was previously published, connections starred at left were omitted.

The drawing here reproduced is correct, and it shows, through the heavy lines, the current paths giving lamp indications of closed 22-kv. breaker and open 66-kv. breaker. There is no actual series connection of the lamps except at the instant of breaker operation, when both the "closed" and "open" control contacts on the breaker are open.

ALEXANDER W. H. LEE.
Manitoba Power Company
Great Falls, Manitoba.

News of the Industry

Experiment in Lower Rates

Southern California Edison Company Cuts Lighting Tariff 14 per Cent for Trial Period of Year

ACTING on its belief that a lowering of the maximum lighting rate to users of electric service would stimulate sales for household purposes and thus reduce service costs, the Southern California Edison Company, after consultation with the Railroad Commission of California in an informal conference, and with its approval, has decided to make an experiment along this line. R. H. Ballard, executive vice-president and general manager of the Southern California Edison Company, following a discussion with the engineering staff, announced that the plan would be put into effect on July 1.

At the present time the maximum rate for lighting and general household use on the lines of the Edison company in southern California is 6.5 cents a kilowatt-hour. Under the experimental plan this will be reduced to 5.6 cents, a reduction of 14 per cent. In the San Joaquin Valley territory the present 7-cent rate will be reduced to 6 cents. These reductions will apply to all of the company's 365,000 domestic, agricultural and industrial consumers. It is proposed to try the plan for one year, after which a careful check will be made to see if the estimates made by the Railroad Commission have proved to be correct.

"Consumption often increases when prices are reduced, and we hope this will prove true in this case," said Ezra W. Decoto, president of the Railroad Commission, following the conference. "Much of the cost of supplying electricity to residences consists of the fixed charges on connection investment and the expenses of meter reading, bookkeeping and collecting. These charges are just the same in the case of a house using 10 kw.-hr. during the month as in one taking 40 kw.-hr. or more. If you can encourage the small household to use more electricity by reducing the price, the additional expense to the company should be negligible and the housewife will benefit by the substitution of more electricity for her own muscular energy."

"We welcome the opportunity to make this experiment," said Mr. Ballard, speaking for the Southern California Edison Company. "The lower rates will affect 365,000 consumers, reaching every corner of our territory, as our lighting rates are uniform, with exactly the same charges for the farmer in the agricultural centers as are applied in the cities and industrial sections. A few years ago electricity was used in residences only at night, but the increased use of washing machines, ironers, vacuum cleaners, refrigerators and small appliances has had the effect of spreading out the demand, making reductions in lighting rates possible from time to time. Eastern visitors consider our present rates unusually low, but we are glad to give domestic consumers the opportunity to make them still lower. Whether the experimental rate becomes permanently effective depends entirely on how it is accepted by the public. If our customers take full advantage of it, there is no apparent reason why it should not continue."

Gherardi Formally Elected

A.I.E.E. Names Its New President Together with Five Vice-Presidents and Three Managers

BANCROFT GHERARDI, vice-president and chief engineer of the American Telephone & Telegraph Company, New York City, was formally elected president of the American Institute of Electrical Engineers at the annual business meeting held in the Engineering Societies Building, New York, on May 20. This action followed his selection by the national nominating committee, as announced in the ELECTRICAL WORLD for Dec. 25, 1926 (page 1338), when a short biographical sketch of Mr. Gherardi was printed. Other officers named at that time were also formally elected as follows:

© Underwood & Underwood.
BANCROFT GHERARDI

For vice-presidents: Middle Eastern District—J. L. Beaver, associate professor of electrical engineering, Lehigh University, Bethlehem, Pa.; Southern District—C. O. Bickelhaupt, vice-president Southern Bell Telephone & Telegraph Company, Atlanta; North Central District—O. J. Ferguson, dean College of Engineering and professor of electrical engineering, University of Nebraska, Lincoln; Pacific District—E. R. Northmore, superintendent of electric distribution, Los Angeles Gas & Electric Corporation, Los Angeles; Canada District—A. B. Cooper, general manager Ferranti Electric Limited, Toronto.

For managers: F. C. Hanker, manager central-station engineering, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; H. P. Liversidge, vice-president and general manager Philadelphia Electric Company, Philadelphia; E. B. Meyer, chief engineer Public Service Production Company, Newark, N. J.

For treasurer: George A. Hamilton, electrical engineer (retired), Elizabeth, N. J.

These officers, together with the following hold-over officers, will constitute the board of directors for the next administrative year, beginning Aug. 1: C. C. Chesney, Pittsfield, Mass.; M. I. Pupin, New York City; H. M. Hobart, Schenectady, N. Y.; B. G. Jamieson, Chicago; George L. Knight, Brooklyn, N. Y.; H. H. Schoolfield, Portland, Ore.; A. E. Bettis, Kansas City, Mo.; John B. Whitehead, Baltimore; J. M. Bryant, Austin, Tex.; E. B. Merriam, Schenectady, N. Y; M. M. Fowler, Chicago; H. A. Kidder, New York City; E. C. Stone, Pittsburgh; I. E. Moultrop, Boston; H. C. Don Carlos, Toronto, and F. J. Chesterman, Pittsburgh.

The annual report of the board of directors, presented at the meeting, showed a net increase in the membership during the year of 186, the total membership on April 30 being 18,344. In addition to the three national conventions of the Institute and five regional meetings, there were 1,273 meetings held by the local organizations in the principal cities and educational institutions in the country.

Public Utilities Commission for San Francisco

Voters of San Francisco will be asked at the Nov. 6, 1928, election to pass upon a charter amendment which would create a Public Utilities Commission of three to manage the Spring Valley water system, if the people vote to acquire it; the distribution of the Hetch Hetchy municipal water supply, the municipal railway, and a power distribution system for city-produced power, should the people vote to acquire one of both of the two privately owned distribution systems in the city. The three members of the commission would be appointed by the Mayor and hold office for a period of six years, one to go out of office every two years. They would be paid $20 a meeting, with a maximum of $2,000 in any one year, and serve in effect as a board of directors of the city's utilities. Each commissioner would be required to furnish a bond of $25,000.

The commission would have power to appoint a utility manager who, with the sub-managers of the several departments or bureaus, would not be subject to civil service rules. They would report directly to the commission and be removable at the pleasure of the commission. The commission would have power to fix rates, order extensions, fix salaries, sell bonds voted by the people and use the proceeds to carry out projects under its direction. Ab-

solute control of the various utilities would rest with the commission so long as they were self-supporting, and the commission would go to the board of supervisors of the city only when money from the general tax fund was needed.

The first bureaus to be created would be a water bureau and a transportation bureau, and at such time as the city might go into the business of municipal distribution of power a bureau would be established to handle that activity.

A.I.E.E. Ready for Detroit

Well-Balanced Program Will Be Presented at Annual Summer Meeting in Michigan Metropolis

FOLLOWING its March, April and May regional meetings at Kansas City, Bethlehem and Pittsfield respectively, the American Institute of Electrical Engineers will on June 20 assemble at the Book-Cadillac Hotel, Detroit, for its annual five-day summer convention, which will be marked by the usual well-balanced list of papers and attractive recreational features. For the technical sessions a large number of papers on practical operating subjects have been chosen, in addition to some of the latest scientific and theoretical contributions. These papers include such subjects as power stations, transmission-line operation, relays, control circuits, cable joints, communication, dielectrics, corona, rectifiers, electrical units and electric traction. Virtually all fields of electrical engineering will be covered in the reports of the technical committees, which are scheduled for presentation on Wednesday morning, June 22.

Engineers connected with railway companies will be particularly interested in the session on catenary suspension, at which five excellent papers will be presented on June 24. Another technical feature of unusual interest will be the lecture by Prof. C. T. Compton of Princeton University on "The Nature of the Electric Arc." This lecture will explain the phenomena of electric arcs in accordance with modern physical theories. A conference of delegates of the Institute sections and of branch counselors will be held under the auspices of the sections and branch committees on Monday, June 20. This entire day will be devoted to a discussion of section and student branch problems—the first technical session starting on Tuesday.

Entertainment will include a moonlight excursion up the river and into Lake Huron, besides the customary provision for sightseeing, dancing, golf, tennis and so forth. Visits will be made to the Detroit Edison Company's great generating plants and to automobile and other industrial establishments. The afternoons will be devoted to these pursuits. A steamer trip to Mackinac Island and Georgian Bay is being planned for the benefit of Institute members and their guests. It will start from Detroit on Saturday, June 25, and return there on Tuesday, June 28.

More Middle West Storms

Indianapolis in Path of One on May 18 —Another on May 23 Hits Northern Illinois and Indiana

NATURE is keeping up her interference with industry and electric service in the Middle West, and light and power companies in that region have been kept on their mettle to repair the damage from violent storms and bring about the resumption of suddenly interrupted service.

With all available construction and repair forces working strenuously to repair the damage caused by a tornado which swept across eastern Indianapolis on Wednesday night, May 18, officials and employees of the Indianapolis Power & Light Company, the Indianapolis Street Railway Company and other utilities worked steadily for 48 hours before any semblance of order was restored. Indianapolis repair crews were augmented by volunteers and by repair crews brought from all sections of the state. They labored steadily removing poles and restoring broken and tangled wires to their places.

The Indianapolis Power & Light Company, with 150 men pressed into duty as soon as the storm had abated, bent every effort toward a speedy resumption of service. It was restored first to the industries of the district in order that they might again begin operations. Officials of the company said that the interconnected loop system of high-tension wires about the city, built to minimize damage in such emergencies, made possible the continuance of operations from the four main stations and all substations throughout the storm. Norman A. Perry, president of the company, said it was impossible yet to estimate accurately the extent of the damage. Street-car service on two main lines of the car company was badly curtailed for many hours. The storm seemed to be accompanied by a veritable cloudburst throughout the central section of the state and electric and interurban service was badly hit.

Five days later, on Monday, May 23, a severe wind and rain storm caused heavy damage in northern Illinois and northern Indiana, and power and light lines are reported to have suffered severely. Warsaw, Monticello, South Bend and Monon, Ind., and Ottawa, Ill., were in the path of storms. Hundreds of telegraph and telephone poles were blown down, and at Hoopeston, Ill., a 100-ft. smokestack of the Central Illinois Power Company was overthrown.

Tentative Program of Annual Convention of A.I.E.E.

DETROIT, MICH., JUNE 20-24

Tuesday, June 21

Morning.—Address of welcome by the Mayor.

President's address, C. C. Chesney.

"Holtwood Steam Plant, Design and Operation in Co-ordination with Water Power," F. A. Allner, Pennsylvania Water & Power Company.

"Auxiliary Power Supply for Richmond Station," J. W. Anderson, Philadelphia Electric Company, and A. C. Monteith, Westinghouse Electric & Manufacturing Company.

"Recent Investigations of Transmission-Line Operation," J. G. Hemstreet, Consumers Power Company.

"Ground-Relay Protection for Transmission Systems," B. M. Jones and G. B. Dodds, Duquesne Light Company.

"Use of High-Frequency Currents for Control," C. A. Boddie, Westinghouse Electric & Manufacturing Company.

Wednesday, June 22

Morning.—Presentation of technical committee reports. (These reports will be presented in two simultaneous sessions).

Evening.—Dinner, with addresses by prominent industrial leaders.

Thursday, June 23

Morning.—"Printing Telegraphs on Ocean Cables," Herbert Angel, Western Union Telegraph Company.

"Electrical Reproduction of Sound," E. W. Kellogg, General Electric Company.

"Electromagnetic Waves Guided by Parallel Wires," S. A. Levin, National Electric Light Association.

"High-Voltage Multiple-Conductor Joints," Thomas F. Peterson, Brooklyn Edison Company.

"The International Electrical Units," E. C. Crittenden, Bureau of Standards.

Friday, June 24

Morning.—Session A:

"An Investigation of Corona Loss," E. C. Starr and W. L. Lloyd, General Electric Company.

"Law of Corona and Dielectric Strength," F. W. Peek, General Electric Company.

"Puncture Voltage as a Precision Measurement," V. Bush and P. H. Moon, Massachusetts Institute of Technology.

"The Electrical Resistivity of Insulating Materials," H. L. Curtis, Bureau of Standards.

"Electric Strength of Solid and Liquid Dielectrics," William A. Del Mar, Habirshaw Cable & Wire Corporation; W. F. Davison, Brooklyn Edison Company; R. H. Marvin, Johns Hopkins University.

"Mercury-Arc Rectifier Phenomena," D. C. Prince, General Electric Company.

Session B:

"Current Collection from an Overhead Contact System Applied to Railroad Operation," S. M. Viele, Pennsylvania Railroad.

"Catenary Design for Overhead Contact Systems," H. F. Brown, New York, New Haven & Hartford Railroad.

"Catenary Construction for Chicago Terminal Electrification of Illinois Central Railroad," J. S. Thorp, Illinois Central Railroad Company.

"Collection of Current from Overhead Contact Wires," R. E. Wade and J. J. Linebaugh, General Electric Company.

"Railway Inclined-Catenary Standardized Design," O. M. Jorstad, Westinghouse Electric & Manufacturing Company.

Reorganization of S.E.D.

Directors Appoint on Their Board the Heads of Five Major Associations in the Industry

THE contemplated reorganization of the Society for Electrical Development for purposes of co-ordination and to insure full co-operation and representation of other bodies in the industry was consummated by the board of directors of the society at a meeting on May 24. Amendments to the bylaws were adopted making provision for membership on the board, as directors of the society, of the individuals who head the contemporary administrations of the several national group associations, together with others representative of the local electrical leagues.

The essential changes provide procedure for bringing on the board of the society the president, the chairman of the Commercial National Section and the managing director of the National Electric Light Association; the president, the managing director and one other representative of the National Electrical Manufacturers' Association; the chairman of the executive committee, the managing director and one other representative of the Electrical Supply Jobbers' Association; the president, the general manager and one other representative of the Association of Electragists International; the chairman, the vice-chairman and one other representative of the League Council. These are in addition to the other directors.

The directors immediately put the enlarged plan into effect by appointing as directors R. F. Pack, president N.E.L.A.; J. E. Davidson, chairman Commercial National Section, N.E.L.A.; Paul S. Clapp, managing director N.E.L.A.; Gerard Swope, president N.E.M.A.; A. E. Waller, managing director N.E.M.A.; Laurence W. Davis, general manager A.E.I., and J. E. North, representing the League Council. George E. Cullinan, chairman of the executive committee, E.S.J.A., and C. L. Chamblin, president of the A.E.I., were already directors of the society. These appointments were made possible by expiration of the terms of other directors. The complete new plan will come into effect at the next annual meeting. The board of directors as reconstructed will hold its first meeting at Atlantic City on June 6.

Senators Are Heard from on Potomac Development

The Federal Power Commission has been asked by Senator Norris of Nebraska, Senator Johnson of California, Senator Dill of Washington and Senator-elect Blaine of Wisconsin to take no action on the application of the Potomac River Corporation for rights on the Potomac River above Washington. Senator Norris makes the point that Congress has shown an unmistakable intention of proceeding with the development of the river's power resources. He cites as evidence the action of the Senate in passing such a bill with large majorities on three occasions. He also points out that the House of Representatives at the last session held hearings and did considerable work on the legislation though it failed to take final action. He predicts that the question will be disposed of finally at the next session. Senator Johnson in his communication expresses the opinion that the government should develop the Potomac as an object lesson for the nation.

California to Have Colorado River Commission

A permanent commission to safeguard California's interests in the Colorado River was brought into being last week, when Governor Young approved the Colorado River Commission bill. This bill authorizes the Governor to name a commission of three "to hold meetings and conferences within and without the state with representatives of other states or communities and with representatives of the United States relating to interstate agreements, compacts, water rights and any and all things in which California or its citizens are or might be interested in or relating to the Colorado River."

Injunction Suit Aimed at Conowingo Development

An equity suit was filed in the United States District Court at Philadelphia on Wednesday by James C. Colgate of Bennington, Vt., who seeks an injunction to restrain the Philadelphia Electric Company from acquiring his land by the right of eminent domain. Mr. Colgate owns four parcels of land, two on each side of the Susquehanna River, on the border of Pennsylvania and Maryland and just below the site of the Conowingo Dam.

In the suit the Water and Power Resources Board of the Department of Forests and Waters of Pennsylvania, the Pennsylvania Public Service Commission and the power company are named as defendants, and the action is to enjoin the state authorities from issuing formal permits and the power company from exercising rights thereunder. The court entered orders restraining the state authorities from entering any final orders pending a decision in the suit. There will be a hearing on June 2.

Electrical Engineers Throng Pittsfield

Regional Meeting of Institute Carries Out Diversified Program—High-Frequency Measurements and Power Transmission Among Topics That Hold Attention

STRIKING progress in high-frequency measurements, quantitative investigations in radio engineering and recent developments in transmission practice were dilated on at the fourth annual regional meeting of the Northeastern District of the American Institute of Electrical Engineers this week at Pittsfield, Mass. Sessions began Wednesday morning at the Maplewood Hotel with an address of welcome to about 300 members by H. M. Hobart, vice-president district No. 1, and greetings by E. F. Gehrkens, chairman of the Pittsfield Section. President C. C. Chesney then gave a short talk upon the standardization problem, declaring his belief that the confidence of the various trade associations in the Institute would make possible the carrying out of the general plan outlined by him at the midwinter meeting.

The first technical session was conducted by Prof. A. E. Knowlton of Yale University, and fifteen papers were presented before luncheon. These papers formed a symposium which emphasized the great importance of recent progress in the field of high-frequency measurements as demanded by advances in both radio and wire communication. Representatives of the Bell Telephone Laboratories, American Telephone & Telegraph, General Electric, Westinghouse, Weston Electrical Instrument, Dubilier Condenser and General Radio companies contributed papers on improving methods of measurement, and these were followed by contributions from Frederick Bedell and H. J. Reich of Cornell University and H. M. Turner of Yale along these lines.

W. N. Goodwin, Jr., described the use of the radio-frequency voltmeter with a frequency error of about 1 per cent at 1,500 kilocycles, and C. T. Burke outlined a substitution method of determining inductor and capacitor resistance. The use of a condenser shunt with a thermocouple for measuring high-frequency current of large magnitude was discussed by A. Nyman, and Paul MacGahan took up the current-transformer problem in this field. A double-detection type of receiver for studying radio field strengths was covered by C. R. Englund and H. T. Friis. H. D. Oakley presented methods of analyzing quantitatively radio receiver performance. Telephone carrier-frequency measurements in relation to attenuation, impedance and cross-talk were discussed by H. A. Affel and J. T. O'Leary and the effect of transpositions was noted. Other papers were contributed by E. I. Green, W. J. Shackleton and J. G. Ferguson, E. Peterson, J. W. Horton, S. C. Hoare, P. G. Edwards and H. W. Herrington. Substitution methods played an important part in much of the matter presented.

Four papers on mechanical forces in electric circuits, including one on transformers, were abstracted in the afternoon session Wednesday, F. L Hunt presiding. The authors, who included Prof. V. Karapetoff of Cornell, Prof. H. B. Dwight and J. Walter Roper of the Massachusetts Institute of Technology and J. E. Clem of the General Electric Company, attacked the subject from both the mathematical and the experimental angles. In a brief discussion E. H. Dodge described experiments at the Massachusetts Institute upon the behavior of mercury in a trough under heavy current stress, and Professor Karapetoff suggested

various methods of simplifying computations of mechanical stresses in conductors useful in electric melting.

The rest of the program included technical sessions on Thursday, Friday and Saturday, a student convention Friday afternoon, the convention dinner Thursday evening and inspection trips to the General Electric factories and local industrial plants. A total registration of about 600 was anticipated.

Purchases and Mergers

Another Maryland Consolidation—Small Transactions Are Reported from Many Territories

PERMISSION of the Maryland Public Service Commission has been asked by the Electric Public Utilities Company, chartered in Delaware last February, with offices in Chicago, to buy the Home Electric Company of Lonaconing, Md.; the Emmitsburg (Md.) Electric Company, the Antietam Electric Light & Power Company and the Midland Electric Light Company, all western Maryland concerns. The purchase price for the combined plants is given as $468,000, while their outstanding stock at par value is worth only $44,375. Reproduction cost was figured by Day & Zimmermann, the company's engineers, at $414,067. The Antietam company operates a small hydro-electric plant to supply part of its needs. The three other companies buy their power from the Potomac Edison Company. Hearing by the Maryland commission was begun on May 25. Any connection with the Potomac River Corporation, whose extensive water-power plans were noted last week (page 1078), was denied by the Electric Public Utilities Company.

Applications filed by the Philadelphia Electric Company with the Pennsylvania Public Service Commission for franchises granted to the Plymouth District Power Company, Whitpain Power Company and Worcester Power Company, in Montgomery County, have been examined and referred affirmatively to the commission for final action. It was explained by a representative of the Philadelphia Electric Company that the project was a link for supplying continuous power from Conowingo, by a modern transmission line to be built through the territory.

Petition has been filed with the New York Public Service Commission by the Rockland Light & Power Company of Nyack and the Oakland Power Company, Inc., to merge the latter with the former through acquisition of its capital stock. The Rockland company generates and sells electricity in Rockland County, the west portion of Orange County and the east portion of Sullivan County, and owns and operates hydro-electric plants on the Mongaup and Neversink Rivers. The Oakland company was formed to develop water power on the Neversink, but never acquired the lands and rights necessary, which instead went to the Rockland company.

Emory Souve of Vienna, Oneida County, N. Y., has filed a petition with the Public Service Commission for permission to transfer to the Niagara, Lockport & Ontario Power Company his electric distribution system in the town of Vienna, except the generating plant and distribution system at Carnival Park, Sylvan Beach.

Sheldon, Iowa, served by the Iowa Public Service Company, on May 4 voted down a proposal to build a municipal electric light plant by 618 to 494.

By 226 to 11 Ahoskie (N. C.) voters decided on May 2 to sell their distribution system to the Virginia Electric & Power Company.

Winton, N. C., is the latest municipality in that state to agree with the Virginia Electric & Power Company for a sale of the town's electric distribution system and the granting of a franchise. An election will be held within a few weeks to decide whether to ratify the agreement.

The Buena Vista Electric Light & Power Company of Buena Vista, Col., was sold by Shyrock Brothers to the General Ice & Storage Corporation on May 17. The purchasing company has ice and storage plants from the Missouri River to the Pacific Coast.

Approval of purchase by the Indiana Water Service Company of Indianapolis of six Indiana electric power and water utilities has been given by the Indiana Public Service Commission. The total cost is $1,072,500. The companies to be taken over are the Montpelier Utilities Company, the Jonesboro Water Company, the Albany Water & Light Company, the Washington Water, Light & Power Company, the Indiana Power & Light Company of Butler, and the People's Utilities Indiana Corporation of Greensburg. The purchasing company is not to seek any increase in rates for two years.

Sun Prairie, Wis., last week voted down by 233 to 79 a proposal to sell its power distribution system for $45,000 to the Wisconsin Power & Light Company. The same proposal was defeated two years ago.

The Board of Public Utility Commissioners of New Jersey has approved a merger of five underlying companies of the Public Service Electric & Gas Company. The consolidation involves the Paterson & Passaic Gas & Electric Company, the Somerset, Union & Middlesex Lighting Company, the New Brunswick Light, Heat & Power Company, and two subsidiary gas companies —the Hudson County and the Essex & Hudson County.

Governor Approves Michigan Savings Banks Law

The bill passed, as noted last week, in the State Legislature of Michigan to make refunding mortgage bonds of electric and gas companies organized or doing business under the laws of Michigan legal investments for savings banks in the state has been approved by the Governor. Previously only first mortgage bonds of such companies were legal investments. The bill is understood to be modeled after the recent Massachusetts enactment. The Minnesota Legislature has passed a bill along similar lines.

New River Project Indorsed

Chief of Engineers Favors Appalachian Company's Plans—Navigation Is to Be Safeguarded

FAVORAGLE report has been made by the Chief of Engineers on the application of the Appalachian Electric Power Company of Charleston, W. Va., to the Federal Power Commission for a license covering a development on New River near Radford, Va. The company proposes to construct a dam 110 ft. high which will create a reservoir covering 4,000 acres extending 13 miles up the river. The power house will be a part of the dam, and 80,000 hp., or possibly 100,000 hp., will be installed. Secretary Jardine, one of the members of the Federal Power Commission, was recently in the Radford region and reports that the project has strong local support. It is expected that the commission will authorize the issuance of the license at its next meeting.

The project was initiated with the filing of a declaration of intention in 1925 by the New River Development Company, the predecessor in interest to the Appalachian company. The original applicants strenuously opposed the taking of jurisdiction by the Federal Power Commission. The Governor of West Virginia, however, insisted that the commission take jurisdiction because of the effect on the Kanawha River, on which there are important navigation considerations. The commission finally took jurisdiction in the case and will insert conditions in the license calculated to safeguard navigation.

Formal Claim by Alabama to Revenue from Wilson Dam

The United States Attorney-General on May 23 listened personally to extended arguments advanced by Alabama's Muscle Shoals Commission in support of the state's contention that it should have a part of the revenue accruing from the sale of hydro-electric power developed at the Wilson Dam after the government shall have recovered the original cost of the power project. The state bases its claim upon ownership of the bed of the river on which the dam rests. It was admitted, however, that the improvements in the Tennessee River at Muscle Shoals put in by the federal government were lawfully and rightfully made. The members of the Alabama commission also contended that the federal government has no constitutional power to manufacture and sell for commercial purposes electric power generated at Muscle Shoals. It was admitted that the government can generate power for its own use and sell enough of it to pay for the upkeep of the project and to return its original cost.

G. W. Jones is chairman of the Alabama commission. The other members who accompanied him at the conference with the Attorney-General were John S. Tilley, W. E. James, B. D. Waddell, C. L. Tompkins and C. W. Ashcroft. The conference also was attended by the Judge Advocate-General of the army and other law officers.

Middle West Division's Good Meeting

Convention at Topeka Leans Strongly to Commercial Side—Accident Prevention Finds an Active Protagonist—Holding Company an Economic Development

THAT the holding company is a natural growth in the utility industry, a development which economic law has brought about in the same way that the evolutionary processes of nature have wrought new forms to fit changing natural conditions, was the theme of the address delivered by Colonel George T. Buckingham, general counsel of the North American Light & Power Company, at the banquet of the fifth annual convention of the Middle West Division of the National Electric Light Association, held at Topeka, Kan., May 18 to 20. Colonel Buckingham was introduced by George O. Lee, general counsel of the Continental Gas & Electric Company. The banquet marked the high point of the convention, the culmination of a day given over to commercial sessions, which, in common with those of other sections since the national convention last year, were full of interest aroused by the speakers and evoking the enthusiasm of large audiences.

The convention began with the keynote address of the president of the division, F. H. Brooks, vice-president and general manager of the Nebraska Gas & Electric Company, Lincoln, in which was reviewed the progress of the industry in the past ten years. Following talks by Paul S. Clapp, managing director National Electric Light Association, on "Where the National Association Comes In"; by W. A. Jones, chairman Public Relations National Section, on "Cordial Public Relations Sustained," and by L. O. Ripley, vice-president Kansas Gas & Electric Company, Wichita, the first meeting was turned over to the women's committee, Miss Ruth Menoher presiding.

Asking "Are Women's Committees Worth While?" C. M. Chubb of the United Light & Power Company, Davenport, Iowa, answered with an unqualified affirmative, and proof of his assertions was forthcoming in papers by Mrs. Will Minier, president Nebraska Federated Women's Clubs; Miss Isabell Davie, secretary of the women's committee of the national body, and Miss Eloise Davidson of Iowa State College. Miss M. E. Brown presented a paper on how the utilities can assist the home maker.

Commercial Topics Uppermost

The second day of the convention was devoted to commercial subjects and was fittingly opened with a talk by J. E. Davidson, chairman of the Commercial National Section, on the question "What Are We Selling For?" M. Luckiesh spoke on the load-building possibilities of residence lighting and proved that this field is yet barely touched. The electric range found an able advocate in P. L. Miles of the Edison Electric Appliance Company, and G. W. Dwelly of the Kelvinator Corporation caught and held his audience with a forceful presentation of the possibilities of electric refrigeration, using the ELECTRICAL WORLD'S analysis of the business as his statistical source. The technique of selling and the application of general principles to the problems of central-station merchandising were lucidly explained by Martin J. Wolf of the Bussman Manufacturing Company, St. Louis, and a paper on rural electrification by G. C. Neff, chairman of the N.E.L.A. rural electric service committee, was read. R. F. Pack, national president, in his address, declared for pushing farm service.

The engineering session on the third day brought out two interesting papers on radio interference—one presented by J. O. Smith and the other, by M. D. Hooven, read by Ford Bates of the Nebraska Power Company—besides a good paper read by J. K. McNeely reporting exhaustive tests on 1½-kva. transformers for rural service.

K. R. MacKinnon, chairman of the N.E.L.A. accident prevention committee, exhibited charts of accidents for 1923-25 that were the base for comparisons between the central station and other industries and which were emphatically not to the credit of the former. He then asserted that the safety engineer was commonly used as a scapegoat to receive the blame that should be shouldered by executives. Mr. MacKinnon proved a vigorous speaker.

Officers for the ensuing year were elected by acclamation and are: President, Don M. Sterns, Central Iowa Power & Light Company, Fort Dodge, Iowa; first vice-president, F. S. Dewey, Kansas City Power & Light Company; second vice-president, Ralph T. Smalley, general superintendent Kansas Electric Power Company, Lawrence, Kan.; third vice-president, K. R. MacKinnon, general superintendent Nebraska Power Company. A change in the organization of the Middle West Division will come about on July 1, when Thorne Brown will become the first managing director of the division as well as its secretary-treasurer. Mr. Brown leaves a position as director of the industrial department of the Omaha Chamber of Commerce, to which he had gone after twelve years on the Railway Commission of Nebraska.

Insull Medal to Kansas Man

An outstanding act of heroism which occurred Aug. 26, 1925, came to notice with the presentation of an Insull medal to O. Wylie Lennen at the closing sessions of the Middle West Division, N.E.L.A., convention in Tokepa last week. Lennen, a lineman for the United Power & Light Corporation at Hutchinson, Kan., saved the life of A. M. Billings, his foreman, when the latter, in changing insulators on a live high-voltage transmission line, came in contact with a 33,000-volt circuit. Unmindful of his own danger, Lennen reached up with his "hot-wire" stick and pulled together two of the wires of the three-phase installation. The blinding arc that resulted caused the circuit breakers at Hutchinson, 25 miles away, to operate, and Billings dropped from the top wires and fell across a 6,600-volt line, from which he was lowered to the ground. Lennen then climbed down the pole and applied artificial respiration with such success that Billings was breathing again before a doctor could arrive. It was eighteen months after the accident, however, before he could return to work.

K. R. MACKINNON PINS INSULL MEDAL ON O. WYLIE LENNEN; SUPERINTENDENT JOHN H. MULLISON OF HUTCHINSON AT RIGHT

The Insull award to Lennen is the second to be made within a year to an employee of the United Power & Light Corporation, Paul Elbert of Abilene having received one at Manhattan last October during the state meeting of the N.E.L.A.

Chairman of Kansas Commission Attacked by Legislators

Immediate removal of Lew T. Hussey, chairman of the Kansas Public Service Commission, has been demanded of Governor Ben S. Paulen by the legislative committee appointed to probe alleged irregularities in the conduct of the commission. This demand is an outgrowth of charges made by Senate members during the last session of the Legislature. "The affairs of the Public Service Commission are in a chaotic and demoralized condition caused by jealousies, turmoil, dereliction of duty, favoritism, a system of espionage, attempted graft and attempted bribery," the letter demanding Mr. Hussey's removal asserts, and it goes on to make a severe personal attack upon Mr. Hussey's conduct as chairman.

The Attorney-General has been called in conference by the investigating committee. Should Governor Paulen delay action, ouster proceedings probably will be begun. Railroad officials, electric light and power executives and others having dealings with the commission have been before the committee to testify, and the case is said to have brought to light astounding charges and developments.

Iron and Steel Men's Annual Convention and Exposition

The official program for the twenty-third annual convention of the Association of Iron and Steel Electrical Engineers, to be held in connection with the iron and steel exposition at the Syria Mosque, Pittsburgh, on June 13 to 18, has been issued. All sessions will be held at the Pittsburgh Athletic Association Annex, which is the old University Club. The technical program follows:

MONDAY, JUNE 13

Morning.—"Electrical Heating in the Iron and Steel Industry," George H. Schaeffer, chairman committee; "Electrical Developments in the Iron and Steel Industry," W. H. Burr, chairman committee.

Afternoon.—"Safe Practices in Connection with the Operation of High-Tension Power," A. N. Cartwright, West Penn Power Company; George E. Gramm, H. C. Frick Coke Company, Scottdale, Pa., and Thomas E. Hughes, Carnegie Steel Company, Duquesne, Pa., followed by a discussion by safety division and electrical engineers and superintendents of iron and steel plants, central stations and mines.

TUESDAY, JUNE 14

Morning.—Symposium: "Anti-Friction Bearings for Heavy-Duty Steel-Mill Applications, with Particular Reference to Roll Necks," F. W. Cramer, Bethlehem Steel Company, Johnstown, Pa.; C. J. Klein, United Engineering & Foundry Company, Pittsburgh; F. H. Buhlman, Rollway Bearing Company, Syracuse, N. Y.; E. C. Gainsborg, SKF Industries, Inc., New York, and Fred Waldorf, Timken Roller Bearing Company, Canton, Ohio; "The Application of Synchronous Motors in Steel Mills," Harry A. Winne, General Electric Company, Schenectady, N. Y.

WEDNESDAY, JUNE 15

Morning.—Combustion Engineers' Day: "Recent Boiler-Plant Installation at Edgar Thomson Works, Carnegie Steel Company, Braddock, Pa.," R. D. Abbiss, Carnegie Steel Company; "The Flat-Suspended Open-Hearth Roof," A. L. Foell, Donner Steel Company, Buffalo.

THURSDAY, JUNE 16

Morning.—"Electrical Installations at New Structural Mills, Homestead Steel Works, Carnegie Steel Company, Munhall, Pa.," C. A. Menk, Carnegie Steel Company, Munhall, Pa.

Afternoon.—Inspection trip to new structural mills of Homestead Steel Works of Carnegie Steel Company, Munhall, Pa.

FRIDAY, JUNE 17

Morning.—"Fifteen Years of Steel-Mill Illumination—What Change?" by Ward Harrison, National Lamp Works of General Electric Company, Cleveland.

There will be an informal reception and luncheon at 12.30 p.m. on Monday, with a dance in the evening; a dinner-dance on Wednesday evening and a golf tournament on Friday afternoon. Saturday will be maintenance employees' day at the exposition.

First Unit to Go in at Lake Chelan About July 1

Prediction is made that the first generating unit of the Washington Water Power Company's new ten-million-dollar hydro-electric plant at the south end of Lake Chelan, which is to supply power for the electrification of the Cascade division of the Great Northern Railroad, will, if work is continued at the present pace, be producing energy by July 1. The dam is at the south end of Lake Chelan and the power house 11,800 ft. from and 380 ft. below the dam. The tunnel has a clear diameter of 14 ft. and less than 2,000 ft. of the bore remains to be lined with concrete. The crew handling this work is now completing approximately 100 ft. of tunnel lining each day. Owing to an abrupt drop of 350 ft. just before the water strikes the generator wheel it has been necessary to place a heavy steel cylinder within the concrete lining.

The power house is to be 140 ft. high and has a substructure of 70 ft., thus resting on a solid rock foundation. The first generator will be rated at 32,000 hp., and the second will have the same capacity. Work on the north half of the 250-ft. dam has been completed and construction on the south unit is under way. The dam has a total height of 66 ft., and the width of the structure up and down stream is 300 ft. It forms an integral part of the power project and should be completed in July. Clearing along the shores of Lake Chelan, which is to be raised 20 ft. by the dam, is almost completed.

The construction work is being done by Grant, Smith & Company. The General Electric Company has received the contract for generators and lightning arresters for the first unit. The Westinghouse Electric & Manufacturing Company will furnish four transformers and the necessary oil switches. William Cramp & Sons Ship & Engine Building Company will supply the turbine, waterwheels and accessories.

Briefer News

Boston Edison Awards 709 Certificates.—Seven hundred certificates were awarded to 401 students in the educational courses of the Edison Electric Illuminating Company of Boston at the close of the fourth year of such work on May 20. The company now has 3,500 employees. Addresses were given by President C. L. Edgar, E. S. Mansfield, head of the company's educational bureau, and others.

Senator Norris Is Asked to Help Celebrate Ontario Hydro Anniversary.—The city of Kitchener, Ontario, is making arrangements to celebrate on June 9 the silver jubilee of the hydro-electric power movement in that province. Invitations have been sent to Senator George W. Norris of Nebraska, Premier Ferguson of Ontario and the mayor and a representative of the hydro commission of each city and town in the province. Members of the Ontario Hydro-Electric Power Commission are co-operating with the city in ln drawing up the plans for the celebration.

Valuation of Indianapolis Utility for Taxation Purposes.—A valuation of $23,607,000 for taxation purposes for next year has been fixed by the Indiana Board of Tax Commissioners on the new Indianapolis Power & Light Company, into which the Indianapolis Light & Heat Company and the Merchants' Heat & Light Company recently were merged. To this valuation approximately $1,393,000 is to be added in Indianapolis, bringing the total to about $25,000,000. The valuation fixed by the state board is $3,000,000 more than the figure submitted by attorneys for the company at a recent hearing before the board. Local attacks have been launched against the company on the ground that the discrepancy between its valuation for taxation and the $40,000,000 value allowed by the Indiana Public Service Commission for capitalization purposes at the time the merger was approved is too great.

Cheaper Electricity for the Bronx.—More than $100,000 a year will be saved to the customers of the Bronx Gas & Electric Company, serving the third largest borough of Greater New York, when a new schedule of rates, approved by the Public Service Commission, is put into effect by the company on June 1. It is announced that the straight 12-cent rate hitherto in force will be reduced to 11 cents a kilowatt-hour, with graduated decreases down to 6 cents.

Citizens Oppose New Boston Substation.—Residents of the Roxbury section of Boston are opposing the company's plan to erect a substation at 225 Humboldt Avenue, for which it has the approval of the Massachusetts Department of Public Utilities, and an appeal has been taken to the Supreme Court of the state. It is alleged that the property owners were never consulted nor notified of a hearing concerning the project and that the Board of Zoning Adjustment rejected the petition of the company.

Another Transmission Line for South Texas.—The Central Power & Light Company of San Antonio has begun the construction of a 66,000-volt power transmission line between Dilley and Asherton, via Big Wells and Caterina, all in the "Winter Garden" district of south Texas. The line will employ wooden poles, and substations will be constructed at Big Wells, Dilley and Asherton. This project, part of the company's 1927 program, follows the announcement that 75 miles of new transmission lines will be built in the rice belt and Guadalupe district.

Northern States 1927 Program Well in Hand.—The seven-million-dollar construction program of the Northern States Power Company, announced at the first of the year, is now well under way. Among its main items are enlarged generating equipment at the High Bridge plant at St. Paul and at Fargo, N. D.; a new and larger substation at Mankato, Minn., and a transmission line to connect Faribault, Kenyon and Dodge Center, Minn. Work on the Chippewa Falls hydro-electric plant is scheduled to start in September, and about $1,000,000—a third of its cost—will be spent this year.

Southern Sierras Power Company Seeks Increased Rates.—Application has been made to the California Railroad Commission by the Southern Sierras Power Company for a revaluation based on present-day reproduction costs, and hearings have begun at Riverside. The company seeks higher rates, basing its claim on recent decisions of the United States Supreme Court, and will, it is said, appeal to the courts if the commission refuses its plea. The case is being watched with interest in California, especially in the San Francisco Bay region, where all

cities have united in asking a reduction in the rates charged by the Pacific Gas & Electric Company and the Great Western Power Company.

Looking Ahead in Arkansas.—In reply to a request from the *Dixie Magazine*, H. C. Couch, president of the Arkansas Power & Light Company, has contributed an article to that periodical in which he predicts that in the thirteen years from 1927 to 1940 his company will spend in Arkansas between $75,000,000 and $95,000,000 in water-power development, substations, transmission lines and in other ways to serve a vast industrial development that he foresees.

New Hydro-Electric Plant for Montreal.—The Montreal Island Power Company, which controls the water powers at Back River, near Montreal, has closed a contract with the Montreal Light, Heat & Power Consolidated for the sale to it for a period of 30 years of all the power which can be developed at Back River, with provision for extension of the contract for a further period of 30 years, power to be taken in specified annual installments until the entire capacity of the plant is absorbed. It is reported that the ultimate capacity of this development will be 65,000 hp., to be developed under a head of 26 ft. Preliminary work on the project has been going forward for some time. This work will now be expedited, but it is estimated that it will take two years to build the plant.

Georgia Electrical Association Elects New Officers.—C. F. Ludwig of Dublin, Ga., was elected president of the Georgia Electrical Association at the close of the association's eighth annual convention, held recently at the Hotel Henry Grady, Atlanta. Other officers elected are T. W. Moore of the General Electric Company, Atlanta, vice-president, and J. J. McDonough of Dublin, secretary and treasurer. The meeting was attended by 125 members from all parts of the state. Among the speakers were Preston S. Arkwright, president of the Georgia Power Company; Harrison Jones, president of the Coca-Cola Company, and P. C. Gilham, president of the Gilham Electric Company of Atlanta. Entertainment included a luncheon at noon and the regular annual banquet in the evening.

Empire State Women's Section Meets at Schenectady.—A hundred women from the electric and gas companies of New York State journeyed to Schenectady for the third annual convention of the Women's Section of the Empire State Gas and Electric Association, which opened on Thursday and was to continue Friday. The development of home service departments and the participation of women in farm service work were the chief topics. Miss Sara Harris of the Utica Gas & Electric Company is chairman of the section. An address of welcome from Otto Snyder, vice-president of the Adirondack Power & Light Corporation, was scheduled, and other speakers were to be Miss Florence Freer of the Brooklyn Edison Company, Miss Marie Reith of the New York Edison Company, Charles S. Ruffner, president of the Mohawk-Hudson Power Corporation; E. H. Rosenquest, president of the Westchester Lighting Company, and Miss Janet Macrorie, advertising manager of the Public Service Electric Corporation of New Jersey.

Adding Thirty Feet to Baker Dam.—Among the features of the expansion program of the Puget Sound Power & Light Company for 1927 is the increase in the height of the Baker River Dam. This dam is now 263 ft. in height and stores 70,000 acre-feet of useful water. The maximum head is about 225 ft., depending upon the elevation of the tailwater, which is governed largely by the state of the river. This year the company will add 30 ft. to the height of the dam, which will bring the available storage up to 130,000 acre-feet and increase the maximum head to 255 ft. Work is well started and, with favorable weather conditions, should be completed by July 1. The additional head will increase the capacity of the plant from about 42,000 hp. to nearly 50,000 hp., with the present installed capacity of two units. Thus an additional 8,000 hp. will be obtained at the plant for a large portion of the year without new equipment. The most important factor, however, is the storage gained. During the late summer and early fall, before the heavy rains set in, this storage becomes exceedingly valuable. Already the company has added 18 ft. of storage to the reservoir by completing the crest of the dam from an elevation of 405 ft. to one of 423 ft. This will be raised to 435 ft., while the dam proper from bedrock to the top of the new piers will measure 293 ft.

Coming Meetings of Electrical and Allied Societies

National Electrical Manufacturers' Association—The Homestead, Hot Springs, Va., May 30-June 4. S. N. Clarkson, 420 Lexington Ave., New York.

American Association of Engineers—Tulsa, Okla., June 6-8. M. E. McIver, 63 East Adams St., Chicago.

National Electric Light Association—Atlantic City, N. J., June 6-10. Paul S. Clapp, 29 West 39th St., New York.

Association of Iron and Steel Electrical Engineers—Exposition, Syria Mosque, Pittsburgh, June 13-18. J. F. Kelly, Empire Building, Pittsburgh.

Pacific Coast Electrical Association—Santa Cruz, Cal., June 14-18. S. H. Taylor, 447 Sutter St., San Francisco.

Electrical Safety Conference — 109 Leonard St., New York, June 15. R. R. Shepard, 109 Leonard St., New York.

National Electrical Credit Association —Cleveland Hotel, Cleveland, June 16-17. F. P. Vose, 1008 Marquette Bldg., Chicago.

American Institute of Electrical Engineers—Summer convention, Detroit, June 20-24. F. L. Hutchinson, 36 West 39th St., New York.

American Society for Testing Materials — French Lick, Ind., June 20-24. C. L. Warwick, 1315 Spruce St., Philadelphia.

Empire State Gas and Electric Association, Commercial Section—Elmira, N. Y., June 21-22. C. H. B. Chapin, Grand Central Terminal, New York.

Northwest Electric Light and Power Association—Salt Lake City, June 21-24. C. W. Lundquist, Utah Power & Light Co., Salt Lake City.

American Society of Agricultural Engineers—University Farm, St. Paul, Minn., June 22-25. Raymond Olney, St. Joseph, Mich.

North Central Division, N.E.L.A.—Lake Superior steamboats from Duluth, June 24-28. J. W. Lapham, 351 Loeb Arcade, Minneapolis.

Michigan Electric Light Association—Grand Hotel, Mackinac Island, July 5-7. Herbert Silvester, Edison Bldg., Ann Arbor, Mich.

East Central Division, N.E.L.A. — Cedar Point, Ohio., July 12-15. D. L. Gaskill, Greenville, Ohio.

Missouri Hydro-Electric Power Company Asks Leave to Issue Stock.—The proposed hydro-electric power plant on the Osage River near Bagnell, Mo., concerning which several items have been printed recently in these columns, has come into notice again as a result of an application filed with the Missouri Public Service Commission at Jefferson City on May 16 by the Missouri Hydro-Electric Power Company for authority to issue 500 shares of non-par-value common stock and also a note issue of $75,000 at 6 per cent to secure a loan. The common stock would be distributed as follows: Walter Cravens, 250 shares; R. W. Street, 249 shares, and D. C. Fitch, one share. All reside in Kansas City and incorporated the company some time ago. A financial statement presented indicates that funds have been advanced to the company in connection with the Osage River power dam and also for a projected dam and power plant on the Current River and one on Eleven-Point River. The grand total is put at $811,715, of which $593,095 has been expended.

How the Kentucky Utilities Fought the Flood at Hickman, Ky.—Because of the greater damage in states further south, comparatively little has been printed concerning the Mississippi flood in Kentucky. Yet at Hickman, a place of nearly 5,000 persons in that state, the local light and power company, a subsidiary of the Kentucky Utilities Company, had one of the hardest struggles with floodwaters reported anywhere. The flood, says the *Kentucky Utilities News*, covered parts of the city to a depth of 15 ft. to 25 ft. At its highest point, the water stood 10 in. above the floor level of the generating station. Sandbags were used to build up a dike around the front of the structure. By keeping pumps constantly operating, drawing seep water out, the plant was maintained in good condition. There was no interruption to service. For three weeks straight the company's staff kept a 6-in. centrifugal pump going 24 hours a day pumping seep water out of West Hickman in order to save the homes there from the flood. Illumination was supplied to the refugee camp, containing about 2,500 persons, in addition to the regular service supplied to the city. When lightning struck and demolished a business building near Railroad Park, the falling debris tore down power distribution lines serving the eastern end of the town, and service was cut off temporarily. Special measures were taken, however, to provide for emergencies, and Hickman citizens praised the efficient work of the operating staff under W. A. Moore, manager, and E. C. Hardesty, district manager.

Men of the Industry

C. C. Chesney Directs General Electric Manufacturing

Cummings C. Chesney, manager of the Pittsfield works of the General Electric Company, has been appointed a vice-president and chairman of the company's manufacturing committee, heading all manufacturing operations of the organization. **C. E. Eveleth**, manager of the Schenectady works, and **W. R. Burrows**, associate manager of the incandescent lamp department, have also been appointed vice-presidents. **F. C. Pratt**, vice-president in charge of manufacturing, will resign June 1 and **H. F. T. Erben**, assistant vice-president, will retire at the end of the year.

E. C. Deal in New Position

E. C. Deal, who was appointed vice-president and general manager of the People's Light & Power Corporation, as announced in the April 23 issue of the ELECTRICAL WORLD, has been engaged in public utility work for more than 20 years. Starting his business activities with what was then the Georgia Electric Light Company in 1894, he remained with that utility until 1898. Subsequently he was connected in various capacities with Stone & Webster properties in Baltimore, Seattle, Brockton and Terre Haute and in 1904 became chief engineer of the Gas & Electric Company of Bergen County, N. J. When this property was absorbed by the Public Service Corporation of New Jersey, he served as superintendent of the electrical properties of the latter company's electric properties in central New Jersey.

After a period of service with the North Carolina Public Service Company as general manager, he affiliated himself with the J. G. White organization. Later in his varied career Mr. Deal was also identified with the Federal Light & Traction Company for a period of six years, filling important executive positions on several of its properties, and with the Electric Bond & Share Company, during the latter connection serving as vice-president and general manager of fourteen large public utility companies in Cuba. Mr. Deal has been prominent in association work, having been president of the Southeastern Division of the National Electric Light Association, president of the Georgia Public Utilities Association, a vice-president of the National Electric Light Association and a vice-president of the Missouri Public Utilities Association.

F. D. Mahoney, for the past five years commercial manager of the West Penn Power Company, Pittsburgh, has been elected a vice-president of that organization.

R. B. Brown has been appointed head of the illuminating engineering division of the Edison Electric Illuminating Company of Boston, to succeed J. Daniels, who has been appointed an assistant superintendent of the sales department. Mr. Brown joined the staff of the Edison company in 1922, having previously been employed in the laboratory and the sales department at various times as a co-operative student. In addition to company business he finds time to serve as secretary of the Illuminating Engineering Society and also as a member of the home-lighting committee of the New England Division of the National Electric Light Association.

J. Bowes Succeeds T. P. Walker in El Paso

Joseph Bowes has recently been appointed manager of the El Paso Electric Company to succeed Tom P. Walker, who is now in Norfolk, Va. Mr. Bowes goes to his new position from Lake Charles, La., where he was general manager of the Gulf States Utilities Company, Louisiana Division.

JOSEPH BOWES

He was graduated from Cornell University as electrical engineer in 1907 and began work for Stone & Webster companies in 1909. He was first employed as superintendent of operations of the light and power department of the Tacoma (Wash.) Railway & Power Company. In 1916 he was transferred to the Southwestern district as general superintendent at Port Arthur. He was made general superintendent of the Eastern Texas Electric Company in 1923 and transferred to Beaumont. When the property at Lake Charles was purchased in 1924, Mr. Bowes was chosen as manager. It was in 1926 that he became general manager in charge of all operations in Louisiana for the Gulf States Company.

Floyd W. Woodcock has been elected president of the Eastern Shore Gas & Electric Company, Salisbury, Md., succeeding A. E. Fitkin of New York. Mr. Woodcock has also been elected vice-president of Day & Zimmermann, Inc., Philadelphia, and the National Public Service Corporation, control of which was recently acquired by Day & Zimmermann.

C. R. D. Meier, president of the Heine Boiler Company of St. Louis, has been elected vice-president and director of the Combustion Engineering Corporation of New York. The International Combustion Engineering Corporation recently purchased a controlling interest in the stock of the Heine Boiler Company. Mr. Meier will continue as president of the boiler company, but will direct the policy of the company from New York.

Stephen C. Pohe, vice-president of the Penn Public Service Corporation, Johnstown, Pa., has resigned his position with the Associated Gas & Electric System to affiliate himself with the Penn Petroleum Company.

Dr. W. D. Coolidge, assistant director of the research laboratory of the General Electric Company and the inventor of the cathode-ray tube, was made this week the recipient of two gold medals in one day, one having been awarded in Philadelphia by the Franklin Institute and the second in Washington by the American College of Radiology. The Franklin Institute awarded to Dr. Coolidge the Louis Edward Levy medal for his paper on "The Production of High-Voltage Cathode Rays Outside the Generating Tube," the formal announcement of his discovery of the tube. The medal of the American College of Radiology was bestowed "in recognition of his contribution to radiology and the science of medicine."

Obituary

George Williams, a director of the Cities Service Company and for many years an associate of Henry L. Doherty, died suddenly May 25 at Portland, Me. Mr. Williams was a director in many public utility and industrial corporations. He was born in Canada in 1873, but early in his career removed his interests to Cleveland. It was in 1903 that he affiliated himself with the Doherty organization, becoming a leader in developing new uses for gas and electricity. Mr. Williams served in the capacity of stockholders' agent of the Cities Service Company and was an organizer of the Doherty Men's Fraternity, an organization of Cities Service employees.

Fred G. Donnelly, general superintendent of installation of the Northern Electric Company, Ltd., died at his home in Montreal, May 14, in his fifty-second year. Mr. Donnelly, who was well known in Canada, was born in Dewittville, Quebec. In early life he became connected with the Bell Telephone Company of Canada and the Northern Electric Company, Ltd., with which he remained for more than 30 years.

George Whitman Bailey, one of the founders of the Stanley Electric Company, which was acquired by the General Electric Company, Pittsfield, Mass., a number of years ago, died May 19 at his home in Pittsfield, following a heart attack. Mr. Bailey's connection with the electrical industry terminated with the purchase of the Stanley Electric Company by the General Electric Company. He was 79 years of age.

Recent Court Decisions

Commission Must Exercise Its Legal Discretion in Approving Amount of Utility Securities.—The Supreme Court of Wisconsin, in Central Steam Heat & Power Company vs. Wisconsin Railroad Commission, has overruled both the commission, which denied an application by the company for authority to issue securities, and the circuit court, which remanded the case to the commission with directions to grant the application, and has ordered that the commission exercise its legal power to determine the amount of common stock, of preferred stock and of bonds reasonably necessary for the purposes for which they are to be issued and, having made such finding, issue a certificate of authority accordingly. All this, the Supreme Court says, is clearly in accordance with the commission's duty under the statutes. The commission must not deny the application because it thinks the sum asked is too large, but must determine the amount that would be just. (213 N.W. 298.)*

Duty of Power Company to Protect Even Trespasser.—Ruling that power-plant operators are bound to protect the safety of all persons in the habit of frequenting their premises, the Supreme Court of Washington has upheld a judgment for $25,000 given Mabel Clark, eighteen years old, against the Longview (Wash.) Public Service Company. Affirming the lower court's decision, the Supreme Court finds that there were no warning signs in the pumphouse of the utilities property where large numbers of Longview residents visited. The girl was injured when she thrust her head through an open window in the pumphouse and the wind caused 6,700 volts to arc from high-tension wires to a rod to which she held. "The duty of high-voltage electricity owners," the decision read, "to all persons, whether invitees, licensees or trespassers, who it may have reason to believe may come into its proximity is to protect them from injury, and it cannot relieve itself from liability even against a trespasser."

Court Annuls Commission Order for Extension of Service to Territory Already Properly Served.—The West Virginia Supreme Court of Appeals has annulled an order of the West Virginia Public Service Commission requiring the United Fuel Gas Company to supply the Huntington Brick & Tile Company with natural gas notwithstanding that the consumer was being served by the Huntington Development & Gas Company and no complaint was made against that service. The duplicate service had been requested merely in the hope of a low competitive rate. No anti-duplication statute has been enacted in West Virginia. The defense of the United Fuel Gas Company was that it did not have the gas with which to serve the applicant; that it would cost at least $750 to make the connections with its mains and $550,000 to equip itself to supply gas to complainant, and about $1,600,000 to supply gas to all the consumers of the other company, and that then it would be able to furnish no better supply of gas than was being obtained from that company. The commission had believed that the United Fuel Gas Company, being a public service corporation, was bound to supply all applicants regardless of circumstances and conditions. The court held that the commission had authority, when right and justice require it and it would be unreasonable and unjust to do otherwise, to deny the application of patrons of one utility to compel another to duplicate the service and to serve the applicants. The court therefore set aside the order of the commission as based on a mistake of law.

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Commission Rulings

No Presumption of Attempt to Violate Law.—The presumption that a company operating an electric system without the certificate of convenience and necessity required by law did not intend a flagrant disregard of the law was indulged in by the Missouri Public Service Commission in granting a certificate to the Maryville Electric Light & Power Company. There was nothing to indicate, it held, that the company had been unaware of the requirement, and there was no conclusive showing of intent to violate the law. The scales were therefore considered balanced, though the company was warned to comply in future or incur statutory penalties.

Time Limit Is Put on Right to Charge Increased Rate.—The La Farge (Wis.) Electric Company, to which the right to increase materially the rates for electricity charged by it to the Tunnelville Electric Company was granted as of June 26, 1924, nevertheless continued to sell at the old rates until Jan. 1, 1926, when it attempted to charge the new price, against which the Tunnelville company protested on the ground that it was not notified when the rate case was heard and that the increase was prohibitive. The Wisconsin Railroad Commission decided for the Tunnelville company, asserting that the La Farge company had by its continuation of the old charge waived the right to the new one.

Sale of Plant Without Commission Authority Is Invalid.—The North Dakota commission has held that a sale of public utility property without first securing its authority is void. A distribution system in the town of Ashley was sold to the Otter Tail Power Company, but on an application by the company for approval of its purchase the seller objected. A statute provided that no public utility should dispose of its property without first having secured an authorization order from the commission, and that any disposition made other than in accordance with such an order should be void. It was held that the object sought to be obtained by the enactment of the statute was the protection of the public, and that the sale was within the general rule that a sale in violation of a statute with such a purpose was void. The commission said that its power did not extend to the approval of sales already made but is limited to authorization of a sale to be made.

Irrigation District Behind in Payment Must Still Be Served.—The Oregon Public Service Commission has rendered a decision in which it is held that electric light and power companies are not justified in refusing to furnish power to irrigation districts on the ground that the customers are behind in payments for former service. This ruling followed an appeal filed by the Grant's Pass Irrigation District as the result of a refusal on the part of the California-Oregon Power Company to supply further energy to the district until a belated power bill amounting to approximately $9,000 had been paid. The commission ordered the utility to resume service in the district until the state can hold an investigation and hearing.

Consolidation Refused Because Plans Were Vague.—The Pennsylvania Public Service Commission refused to approve the consolidation of the Lawrence Hydro-Electric Company and the Conoquenessing Power Company upon the ground that insufficient information had been furnished. The commission endeavored to obtain from the applicant definite and specific information with respect to the details of contemplated plans for the development of the water power, the manner of financing the project, the negotiations for marketing the electricity generated, and the estimated revenues and expenses of the plant in the various stages of its development. The information furnished was indefinite, vague and uncertain, particularly with regard to plans of financing, constructing and operating the proposed development, and many essential details which had been requested were, the commission said, lacking.

Limited Competition Permitted Under Certain Circumstances.—In granting an application from the Wyoming Power Company for a certificate authorizing it to contract with the city of Riverton to furnish it with power to operate its city pumps, the Wyoming Public Service Commission said that, inasmuch as the company had built an expensive extension to supply the company serving the city, it would be allowed to contract with the city to supply it with power solely for its pumps, although during a breakdown in supply for ten months the city company had contracted with the federal government for energy. The commission observed that the hydro-electric company had operated successfully for a number of years and had restored the breakdown, that the federal contract of the city company is liable to discontinuance, and that the rate for the pumping service affords little or no profit, will not be met by the city company and will enable the extension to exist for the public benefit in emergencies.

Financial and Statistical

Market Moves Sharply Upward Utility Bonds and Savings Banks Bond Market Remains Steady

WITH a general upward movement in which several new high price records were made, public utility stocks have become a center of interest in the markets. Average prices are several points above last week's. Among the features are Edison Electric Illuminating Company of Boston, Brooklyn Edison, Columbia Gas & Electric, Detroit Edison and Middle West Utilities. Quotations on Boston Edison advanced from 257 to 267 early in the week, following announcement of the terms upon which 66,374 shares of stock will be issued. The new price is the highest in fourteen years. At the high point reached early this week the quotation was 50 points above this year's low and compares with the 1913 maximum of 288½.

Preferred issues moved up slightly in isolated cases but did not share the general trend of the common issues.

It is anticipated in investment circles that the bond market will receive an impetus from the new legislation providing for legalization of utility bonds for savings bank investment in Michigan and Minnesota. While for years Michigan laws have admitted only first mortgage bonds of domestic utilities, the new provision widens the list to include "legally authorized mortgage bonds issued or assumed by any gas or electric light or power company organized under the laws of the State of Michigan, or admitted to carry on business in said state," under certain specified conditions. Minnesota also lays down certain carefully defined conditions in making power and light securities legal for savings banks and corporate trustees. This new legislation recognizes the strength and attractiveness of a type of security which is generally used today in financing the expansion of the utility industry. From the standpoint of the investing institutions concerned the new legislation is welcomed since it widens the list of possible holdings to include a group the desirability of which is being more and more recognized.

New Foreign Financing

The Montreal Island Power Company, incorporated under the laws of the Province of Quebec, made an offering of 5½ per cent first mortgage 30-year sinking-fund gold bonds, series A, to the amount of $8,000,000, the price being 100 and accrued interest. Share warrants accompanying these bonds entitle the holder of each one-thousand-dollar bond to purchase two common shares of the company.

Another Canadian company, the United Securities Limited, issued 5½ per cent collateral-trust sinking-fund gold bonds totaling $3,600,000, the price being 100 and interest. The proceeds of this issue will be used for the purpose of funding temporary bank loans and other corporate purposes.

A five-million-dollar loan was floated by the Isarco Hydro-Electric Company (Società Idroelettrica dell' Isarco) in the form of first mortgage 25-year 7 per cent sinking-fund gold bonds. These bonds were priced at 93½ and interest, to yield about 7.60 per cent. This company was formed in 1924 for the purpose of constructing and operating hydro-electric works on the Isarco River in Trentino, Italy.

Ease of Money Market Necessitates Care in Capital Expenditures

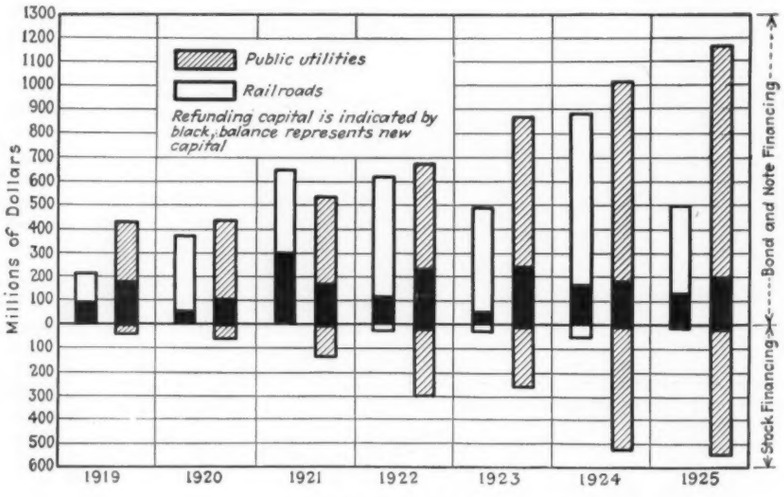
Overdiscounting of Future Would Result in Temporary Retarding of Progress in Utility Industry—Sound Basis for Future Growth Essential

By William S. Barstow
President W. S. Barstow & Company

WHAT effect will the low cost of money and ability to finance easily have upon the future of electric public utilities? Will it lead the industry far beyond its requirements and result in uneconomical investments?

In the early days of the industry it was very difficult indeed to persuade the public to realize the advantages of electric service. There were then only two uses, for light and power, and these were both restricted. Under the forced effort to get the public interested the art naturally progressed slowly. The manufacturer was more or less timid and provided only for the demands of the central-station system. As the use of service was gradually extended the public began to realize that it was no longer a luxury but had become a necessity. Introduction of measuring devices, multiphase current and the steam turbine soon reversed conditions, and demands on the part of the public forced a more rapid expansion of central-station service. While the physical structure was providing for future growth along well-worked-out engineering lines, this condition was by no means present in the financial structure. Public utility securities were not a recognized investment as were those of steam railroads. The bankers of that time followed closely methods of financing real estate, indentures securing bonds following the pattern of real estate mortgages. In fact, cases were rare where an original issue of bonds was not well up to the amount actually authorized, and in very many cases mortgages were closed at the outset. There was an utter indifference to the necessity of proper equity, and several of the leading representatives of banking houses openly expressed their views in writing as to their non-concern with equities.

This early lack of vision on the part of the banker was responsible for a long time for the retarded progress in the development of the industry, as it became difficult to provide economical



Approximate Capital Invested in Utilities and Railroads from 1919 to 1925 Inclusive

financing for the necessary expansion of the physical properties. The engineer and manager of the public utility was perhaps among the first to realize that while he was providing for proper and orderly future growth of his property, the banker was not following the same course with the financial structure. This condition was perhaps responsible for so many public utility operators becoming interested in the matter of financing and for the subsequent adoption by the bankers of the modern open-end mortgages with varying rates of interest and maturities, the variation in the dividend rates on preferred stock, and, in short, the adapting of the entire financial structure to the conditions demanded by the expansion of the industry.

With the standardization of the financial structure and the promotion and retention of public good will by every means possible, the industry has forged ahead until today its securities on an investment basis are everywhere sought for by the public. The question is no longer "Can we finance?" but "Should we finance?" With low money rates and the demands of the public, which now appreciates the stability of public utility investments, there may be a danger of overdiscounting the future, resulting in temporarily retarding progress. Opinions have been frequently expressed that the history of the steam railroad, where overexpansion soon resulted in receiverships and reorganizations, may be repeated in the case of the electric public utility. There is, however, a great difference in the past history of the two. In the early days steam railroads did little to foster and preserve public good will. Their financing was done principally with interest-bearing rather than dividend-bearing securities. Their partners were few, but there was almost no end to their obligations. Neither of these conditions has been present in the case of public utilities. Even in the earliest days, inadequate as were their financial structures, it was always recognized that equities formed the foundation. The accompanying table and chart (printed through courtesy of Halsey, Stuart & Company) show at a glance the weak foundation of the railroad structure and the strong foundation in the case of public utilities.

If the electric public utility continues to preserve its financial structure as it has up to the present time, there need be no worry about receiverships or reorganizations. This, of course, does not apply to holding-company pyramiding, which will no doubt prove dangerous in time of industrial depression. Professor Irving Fisher and

COMPARATIVE RAILROAD AND UTILITY FINANCING

	Railroads		Public Utilities	
	Bonds and Notes	Stocks	Bonds and Notes	Stocks
1919	$208,117,000	.....	$426,216,700	$36,054,950
1920	377,879,500	.....	436,113,600	60,708,950
1921	655,288,500	.....	545,440,000	125,645,220
1922	624,563,250	$26,968,100	678,162,000	302,271,795
1923	490,927,000	27,322,450	876,863,100	261,533,058
1924	884,333,700	55,963,269	1,008,173,900	521,455,927
1925	498,490,500	16,218,230	1,134,112,000	549,133,504
1926	381,738,000	40,845,000	1,486,297,500	488,153,846
Total	$4,121,337,450	$167,317,049	$6,591,378,800	$2,344,957,250

Stock Quotations of Electric Light and Power and Manufacturing Companies

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday May 24	Low 1927	High 1927
ABITIBI PWR. & PAPER, 4% com.—no par	93	83	94
Adirondack Pwr. & Lt.—7% pf.	110	107	110½
Adirondack Pwr. & Lt.—8% pf.	115	112	114
Ala. Pwr., $7 cum. pf.—no par	113½	107	112½
Allis-Chalmers Mfg., 7% pf.	110½	109	112½
Allis-Chalmers Mfg., 6% com.	110½	88	110½
Aluminum Co. of Amer., com.	68½	67½	73
Aluminum Co. of Amer., 6% of	102	101½	101½
Amer. & Foreign Pwr., pf. 25% pd.	*m*110	....	....
Amer. & Foreign Pwr., 7% pf.—no par	97½	86½	99
Amer. & Foreign Pwr., com.—no par	22	18½	25½
Amer. Bosch Magneto, com.—no par	14½	13	18½
Amer. Brown Boveri Elec†	23½	20½	39½
Amer. Brown Boveri Elec., pf. $7	*k* 85	84½	98
Amer. Gas & Elec., 6% pf.—no par	103½	95½	103½
Amer. Gas & Elec., com.†—no par	86½	68½	100½
Amer. Lt. & Trac., 6% pf.	115	112	120
Amer. Lt. & Trac., com.†	*m*246	222	262
Amer. Pwr. & Lt., 6% pf.	104½	97½	104½
Amer. Pwr. & Lt., com.†—no par	63½	54	64½
Amer. Pub. Serv., 7% pf.	£101	95	99½
Amer. Pub. Serv., com.†	65	....	....
Amer. Pub. Utilities, 7% ptc. pf	87	73	88
Amer. Pub. Utilities, 7% pr. pf.	92	88	93
Amer. Pub. Utilities, com.	57	65	70
Amer. States Sec., A	2½	2½	4½
Amer. States Sec., B	2½	2½	4½
Amer. Superpwr., 6% ptc. pf.—25	28½	26½	28½
Amer. Superpwr., 6% 1st pf.	*i* 96	....	....
Amer. Superpwr., Class A†—no par	36½	27½	36½
Amer. Superpwr., Class B†—no par	37½	28½	37½
Amer. Wtr. Wks. & Elec., 7% pf.	£108½	105	104½
Amer. W. W. & E., com. $1.60—20	81	62½	83½
Anaconda Copper 2d $3	46½	45	49½
Appalachian Electric Pwr., 7% 2d pf.	100	100	104
Appalachian Elec. Pwr., 1st pf., 7%	102	100	102
Appalachian Elec. Pwr., com.	*m*78	....	....
Arizona Pwr., 7% pf.	84	77	84½
Arizona Pwr., com.	22	....	....
Arkansas Pwr. & Lt. 7% pf.	103½	....	....
Assoc. Gas & Elec., $3.50—50	52	....	....
Assoc. Gas & Elec., pf.—$6—no par	91	85	93
Assoc. G. & E., Class A, 10—no par	*m* 40½	35	42
BABCOCK & WILCOX, 7% com.	118	....	....
Binghamton L., H. & P., $6 pf.	96	93	98
Birmingham Elec., pf.—$7—no par	108	105	109
Blackstone Valley G. & E., 6% pf.	106	103	105
Blackstone Valley Gas & Elec., 10% com.—50	139½	98	154½
Blaw-Knox, com.†	*i* 70	70	70
Brazilian Trac., Lt. & pwr., com.†	*m*138½	....	....
Broad River Pwr., 7% pf.	100½	97	100
Brooklyn Edison, 8% com.	166	148½	169½
Buffalo, Niagara & East. Pwr., pf.—25	*i* 25½	....	....
Buffalo, Niagara & East. Pwr. com.† —no par	*i* 30½	....	....
CALIFORNIA ELEC. GENERATING, 6% pf.	96½	96	98
California Ry. & Pwr., 7% pf.	135	125	150
Carolina Pwr. & Lt., pf.—$7—no par	*l*109½	107	109
Central & S. W. Util., $7 pf.—no par	*a* 97	93½	97½
Central & S. W. Util., pr. ln. $7 pf. —no par	*a*100½	98½	103
Central Ariz. Lt. & Pwr., 7% pf.	*l*100	100	100
Central Ark. Ry. & Lt., 7% pf.	103	100	104
Central Ill. Pub. Serv., $6 pf.	*k* 88	88	91
Central Ind. Pwr., 7% pf.	92	86	90
Central Pwr. & Lt., 7% pf.	£101	100½	103
Central States Elec., 7% pf.	94	93	96
Central States Elec., com.†	*m*200	....	....
Century Elec., 6% com.	*m*115	115	115
Chicago Fuse Mfg., com.—$2.50 no par	*m* 33½	30	34½
Cincinnati Gas & Elec., 5% com.	*g* 96½	96½	97½
Cities Service, 6% pf. ex. div.	90½	87	92½
Cities Service, pf. B—10 ex. div.	8½	7½	8½
Cities Service, pf. BB—100	83	80½	85½
Cities Service, com.—20 ex. div.	45½	40	58½
Cities Service, Bks. Shrs.—10	*m* 23½	23½	29½
Clarion River Pwr., 8% pf.	....	....	....
Cleveland Elec. Illg., 6% pf.	110½	108	110
Cleveland Elec. Illg., 10% com.	295	302	310
Columbia Gas & Elec., 6% pf.	107	99½	107½
Columbia G. & E. com. $5—no par	96½	82½	96½
Columbia Ry., Gas & Elec., 6% pf.	*m* 94	....	....
Columbus Elec. & Pwr., 7% pf., A	108	....	....
Columbus Elec. & Pwr., $2 com.—no par	64	....	....
Columbus Ry., Pwr. & Lt., 6% 1st pf.	103	98½	99½
Columbus Ry., Pwr. & Lt., 6½% pf. B	102	96	99
Columbus Ry., P. & L., com.—no par	80	75	79
Commonwealth Edison, 8% com.	*a*152½	138	150½
Commonwealth Pwr., 6% pf.	98½	91½	98½
Commonw'th Pwr., $2, com.—no par	51½	49½	52
Conn. Lt. & Pwr., 8% pf.	120	119	123
Conn. Lt. & Pwr., 7% pf.	116	112	113½
Cons. Gas of N. Y., pf.†—50	*k* 56½	55½	62½
Cons. Gas of N. Y., com $5—no par	104½	94	109½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6% pf.	*e*108½	106½	108½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 6½% pf.	*e*111½	110½	112½
Cons. Gas, Elec. Lt. & Pwr. of Balti., 7% pf.	*m*110	111	115
Cons. Gas, Elec. Lt. & Pwr. of Balti., 8% pf.	*e*128½	126	129
Cons. Gas, Elec. Lt. & Pwr. of Balti., com. $2.50—no par	*e* 59	51	58½
Consolidated Pwr. & Lt., 7% pf.	101	100	103
Consumers Pwr., 6% pf.	102	100	102
Consumers Pwr., 6.6% pf.	105	103	105½
Continental Gas & Elec., 8% ptc. pf.	107	103	106½
Continental Gas & Elec., 7% pr. pf.	103½	100	103
Conti. G. & E. com. $4.40—no par	£215	210	225
Crocker Wheeler, com.†	31	....	....
Crocker Wheeler, 7% pf.	82	....	....
DALLAS PWR. & LT., 7% pf.	109	107	109½
Dayton Pwr. & Lt., 6% pf.	104	101	103
Detroit Edison, 8% com.	153	133½	153½
Dubilier Condenser, com.—no par	4½	3½	5½
Duquesne Lt., 7% pf.	£115½	114½	116½
EASTERN NEW YORK UTIL., $7 pf.	103	102	104½
Eastern New York Util. com.	65	70	75
Eastern States Pwr., $7, com.	9	9	13
Eastern States Pwr., pf.	88	90	95
East. Tex. Elec., 7% pf.	107	106	108
Edison Elec. of Boston, $12 com.	*d*267	217	259
El Paso Elec., 7% pf.	108	105	107½
Elec. Bond & Share, 6% pf.	*l*108½	105½	109
Elec. Bd. & Sh. Sec., com. $1—no par	*l* 75	67½	72½
Electric Household Util.†	*a* 15	11	15½
Elec. Investors, 3% pf.—no par.	94	92	94
Elec. Investors, com.†—no par.	39½	32½	40½
Elec. Investors, 10% pd. receipts	*m* 15	....	....
Elec. Pwr. & Lt., ctfs. pf.	104	96	104½
Elec. Pwr. & Lt., ctfs., 40% pd.	£114	103½	114
Elec. Pwr. & Lt., ctfs., full pd.	£111	108½	111½
Elec. Pwr. & Lt., ctfs., com.—no par.	22½	16½	23½
Elec. Refrig. cap.†	25	22½	37½
Elec. Ry. Securities, com.—no par	*m* 6½	....	....
Elec. St. Battery com. $5.25—no par	71½	63½	79½
Elmira Wtr., Lt. & R.R., 7% pf.	101½	99	101½
Emerson Elec., pf.	*m*108½	108½	108½
Empire Pwr., ptc.†	35½	26	38½
Engr. Pub. Serv., $7 pf.—no par	106	93½	106
Engr. Pub. Serv., com.—no par	28½	21½	28½
Eureka Vacuum Cleaner, com. $4—no par	71½	60½	73½
FAIRBANKS MORSE, 7% pf.	112	107½	112
F.-M., com.—$3—no par.	39	37½	43½
Federal Lt. & Trac., com. $1.40	44½	37½	47
Federal Lt. & Trac., $6 pf.—no par.	97½	91½	99½
Ft. Worth Pwr. & Lt., 7% pf.	*l*110½	108	112
GALVESTON-HOUSTON ELEC. 6% pf.	74	68	72
Galveston-Houston Elec., com.	27	22	30½
Gen. Elec., $3 com.—no par	98½	81	100½
Gen. Elec., special—6%	11½	11½	11½
Gen. Gas & Elec. (Del.) com. A, $1.50—no par	42	34	47½
Gen. G. & E. (Del.) com. B—no par.	42	35½	43½
Gen. G. & E. (Del.) pf. A, $8—no par.	117½	113½	118½
Gen. G. & E. (Del.) pf. A $7—no par.	107	100	107½
Gen G. & E. (Del.) pf. B $7	£101	96	104
Gen. Pub. Serv., $7 conv. pf., no par	£107½	102	106
Gen. Pub. Serv., com., no par	15	11½	15
Ga. Lt., Pwr. & Rys., 6% pf.	92	87	92
Ga. Lt., Pwr. & Rys., com.	*m* 60	....	....
Ga. Ry. & Pwr., 8% pf.	£123	119	123
Ga. Ry. & Pwr., 7% pf.	112½	106	110
Gt. Western Pwr., 7% pf.	*h*102½	....	....
IDAHO PWR., 7% pf.	106½	103	105
Ill. No. Utilities, 6% pf.	*k* 88	88	92
Ill. Pwr. & Lt., 7% pf.	100½	99	101
Ingersoll Rand com. $8	94	89½	96½
Int. Combus. Engr., com. $2—no par ex. div.	*k* 48½	43½	64
Int. Util., Class A—$3.50—no par.	35½	28	36
Int. Utilities, Class B—no par.	6½	3	6½
Interstate Pwr., pf.—$7—no par.	£95½	93	98
Interstate Pub. Serv., 7% pf.	99½	98	99½
Iowa Ry. & Lt., 7% pf.	98	97	99
JERSEY CENTRAL PWR. & LT. CO., 7% pf.	101	97½	103
Johns-Manville, com.†—no par.	74½	55½	74½

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f*Montreal; *g*Cincinnati; *h*San Francisco; *i*Pittsburgh; *j*Washington. £Bid price Saturday, May 21. *l*Bid price Wednesday, May 25. *m*Latest quotations available. †Dividend rate variable.

Stock Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Tuesday May 24	Low 1927	High 1927
KANSAS CITY PWR. & LT. pf.$7	115	112	115
Kansas Gas & Elec., 7% pf.	*l*107¼	103	107
Kentucky Hydro-Elec., 7% pf.	*a* 96½	94½	97½
Kentucky Sec.,6% pf.	86	83	87
Kentucky Sec., 5% com.	109½	110	115
Kentucky Utilities, 6% pf.	96	95	97
Keystone Pwr. & Lt., 7% pf.	97	96½	99
LACLEDE GAS LT., 12% com.	253	173½	263
Lehigh Pwr. Sec., com.—no par	19	15	20
Long Island Ltg., 7% pf.	110½	107½	111½
Long Island Ltg., com.†—no par	144	139	153
Los Angeles Gas & Elec., 6% pf.	99	98	100½
Louisville Gas & Elec., cl. A. $1.75	26½	23½	27½
MAN. ELEC. SUPPLY, cap. $5 —no par	68½	53½	72
Manila Elec., com.†—no par	*k* 43½	40	46
Maytag Mfg., com. .50—no par	30½	23½	32½
Memphis P. & L., pf.—$7—no par	108½	107	109
Metropolitan Ed., pf.—$6—no par	99½	93	97
Metropolitan Ed., pf.—$7—no par	107	104	108
Metropolitan Ed., com. $5—no par	67	....	....
Middle West Utilities, 7% pf.	*a*111	105½	113½
Middle West Util., 8% pr. lien	*a*122½	117½	122½
Middle West Util., com. $6—no par	*a*115	108	116½
Midland Utilities, pr. in. 7% pf.	*a*105	98	104
Midland Utilities, 7% pf. A	*a*100	96½	99½
Milwaukee Elec. Ry. & Lt., 7% pf.	*k*102	100	103
Milwaukee Elec. Ry. & Lt., 6% pf.	*k*100	98	101½
Minn. Pwr. & Lt., 7% pf.	*l*107½	104	107
Miss. Pwr. & Lt., $8 pf.	110	106	111
Miss. River Pwr., 6% pf.	101	94	97
Miss. River Pwr. 3% com.	62	....	....
Mohawk Hudson Pwr., 1st pf.—$7 —no par	106	100	109
Mohawk Hudson Pwr., 2d pf.—$7 —no par	104	98	105
Mohawk Hudson Pwr., com.—no par	24½	20½	27
Montana Pwr., 7% pf.	121	118½	123
Montana Pwr., 5% com.	102½	81½	104½
Montreal Pwr., 7% com.	*m*85½	....	....
Mountain States Pwr., 7% pf.	100	97	101
Mountain States pwr., com.†	18½	....	....
NASSAU & SUFFOLK LTG., 7% pf.	107	98	105
National Carbon, 8% pf.	*a*135	130½	137½
National Elec. Pwr., A†	*a* 24½	23½	25½
National Elec. Pwr., 7% pf.	*a* 97	93½	97½
National Lt., Ht. & Pwr., com.	24	....	....
National, Light, Ht. & Pwr., 5% pf.	70	....	....
National Pwr. & Lt., pf.—$7—no par	107½	101	108½
National Pwr. & Lt., com.†—no par.	23	19½	23½
National Pub. Serv., 7% pf.	*k* 96½	93	99
National Pub. Serv., 7% ptc., pf.	113	108	115
National Pub. Serv., A com. $1.60— no par	21½	18½	22½
National Pub. Serv., B com.—no par	*m* 18½	14	20½
Nebraska Pwr., 7% pf.	*l*109	106	109
Nevada-Calif. Elec., com.	*m* 29½	25	31
New Brunswick Pwr., 4% pf.	55	....	....
New Eng. Pub. Serv., pr. in. pf. $7.	100½	98½	101
New Eng. Pub. Serv., pf. $7.	97	95	97
N. J. Pwr. & Lt., 6% pf.	96	92	94
New Orleans Pub. Serv.—7% pf.	104	103	105
N. Y. & Queens Elec. Lt. & Pwr., 5% pf.	90	....	....
N. Y. Central Elec., 7% pf.	102	102	104
Newport News & Hampton Ry., Gas & Elec., 5% com.	109	....	....
Newport News & Hampton Ry., Gas & Elec., 7% pf.	109	....	....
Niagara Falls Pwr., 7% pf.—25	*k* 28½	27½	29½
Niagara, Lock. & Ont. Pwr., 7% pf.	111	110½	113
No. Amer., 6% pf.—50	51½	50	52
No. Amer., com.—no par	50½	45½	50½
No. Amer. Edison, $6 pf.—no par	101	96½	101½
No. Caro. Pub. Serv., pf.—$7—no par	*k* 97	93	97
Northeastern Pwr., com.	16½	14½	18½
No. Indiana Pub. Serv., 7% cum. pf.	104	102	104
No. N. Y. Utilities, 7% pf.	105½	103	105½
No. Ohio Pwr., com.—no par	11½	9½	13½
No. Ohio Trac. & Lt., 6% pf.	80	78	81
No. Ohio Trac. & Lt., 7% pf.	90	90	93
No. Ont. Lt. & Pwr., 6% pf.	*k* 92	84	94
No. Ont. Lt. & Pwr., 4% com.	74	73	78
No. States Pwr., (Del.) 7% pf.	105	101	104
No. States Pwr., (Del.) 8% com.	116½	109½	118
No. Texas Elec., 6% pf.	70	65	70
No. Texas Elec., com.	30	27	36
OHIO BRASS, com. B $4—no par.	82	74	85
Ohio Brass, 6% pf.	105	100	103
Ohio Gas & Elec., 7% pf.	104	95	103½
Ohio Pwr., 6% pf.	101½	96	99
Ohio Pub. Serv., $6 pf.	95	95	96½
Ohio Pub. Serv., 7% pf.	106	104	107
Ohio River Edison, 7% pf.	108	103	108½
Oklahoma Gas & Elec., 7% pf.	101	....	....
PACIFIC GAS & ELEC., 6% pf.	26½	24½	26½
Pacific Gas & Elec., 8% new com.	38	31	38½
Pacific Pwr. & Lt., 7% pf.	*l*103½	102	104
Penn Cent. Lt. & Pwr., $5 pf.—no par	*c* 74½	71½	75
Penn-Ohio Edison, 7% pf.	103½	97½	104½
Penn-Ohio Elec., 7% pf.	99	98	100
Penn-Ohio Pwr. & Lt., 7% pf.	103	99	102
Penn-Ohio Pwr. & Lt., 8% pf.	111	109	112
Penn Pwr. & Lt.—$7—no par.	*l*109½	107	109
Penn Wtr. & Pwr., 8% com.	190½	175½	192½
Phila. Co., 6% pf.—50	52½	50	53
Phila. Co., com.—50	*k*104	85½	110
Phila. Elec., 8% com.—25	*c* 51½	46½	54
Portland Elec. Pwr., 7% pf.	98	97½	100
Portland Elec. Pwr., 6% pf.	*k* 80	78	83
Portland Elec. Pwr., 6% 2d pf.	55	....	....
Portland Elec. Pwr., com.	24	22	30
Potomac Elec. Pwr., pf.	*m*108½	....	....
Pwr. Corp. of N. Y., com. $1—no par	*m* 79	....	....
Pwr. Sec., pf.—no par	*k* 28	28	33
Pwr. Sec., com.—no par	*k* 6	5	8
Public Serv. of Colorado, 6% pf.	101	....	....
Pub. Serv. of N. J., 6% pf.	*k*113½	108½	115½
Pub. Serv. of N. J., 7% pf.	*k*130	125	131½
P. S. of N. J., $2 com.—no par	41	32	41½
Pub. Serv. of No. Ill., 6% pf.	*a*103	102	105½
Pub. Serv. of No. Ill., 7% pf.	*a*115½	112½	116½
P. S. of No. Ill., com. $8—no par	*a*143	140½	142
Pub. Serv. of No. Ill., $8 com.	*a*142	132	140
Pub. Serv. of Okla., 7% pr. in.	99½	99	100½
Pub. Serv. Elec. & Gas, 6% pf.	108½	102	108½
Puget Sound Pwr. & Lt., 7% pr. pf.	107½	105	107
Puget Sound Pwr. & Lt., $6 pf.—no par	87	....	....
Puget Sound Pwr. & Lt., com.	33½	28	34
RADIO CORP. OF AMER., $3.50 pf.—50	50½	49	53
Radio Corp. of Amer., com.—no par.	48½	41½	56½
Republic Ry. & Lt., pf.	*k*120	....	....
Republic Ry. & Lt., com.	*k*135	112	135
Rochester Gas & Elec. 6% pf. D.	*k*103	101	103½
Rochester Gas & Elec., 7% pf. B.	*k*106	105	107
Rochester Gas & Elec., 6% pf. C.	104½	101	103½
SAFETY CABLE, com. $4	*k* 58½	52½	64½
San Joaquin Lt. & Pwr., 7% pr. pf.	107	105	108
St. Joseph Ry., L., H. & P., 5% pf.	70	70	73
Servel Corp.	7	5½	10½
Sierra Pacific Elec., 2% com.	24	....	....
Sioux City Gas & Elec., 7% pf.	103	99	101½
Southeastern Pwr. & Lt., pf.—$7 no par	*l*105½	....	....
Southeastern Pwr. & Lt., ptc. pf.	*i* 78	....	....
Southeastern Pwr. & Lt., com.—no par	36½	29½	36½
So. Calif. Edison, 8% pf.	35	36½	38
So. Calif. Edison, 7% pf.	28	27½	28½
So. Calif. Edison, 6% pf.	25	24½	25½
So. Calif. Edison, 8% com.	34½	31½	34½
Southern Cities Utilities, 7% pf.	85	81	86½
Southern Cities Utilities, com. $4.	36	....	....
Southwestern Lt. & Pwr., A $3.	63	60	65
Southwestern Lt. & Pwr., B.	63	60	65
Southwestern Lt. & Pwr., $6 pf.	85	83	86
Southwestern Pwr. & Lt., 7% pf.	*k*108½	103	108½
Springfield (Mo.) Ry. & Lt., 7% pf.	99	95	100
Standard Gas & Elec., 8% pf.	63½	57½	64
Standard Gas & Elec., 7% pr. pf.	108½	103	106½
Standard G. & E., com. $3.50—no par	59	54	59½
Standard Pwr. & Lt., 7% pf.	102	98	100
Staten Island Edison, pf.—$6—no par	100	99	101
Superheater, $6 com.—no par	180	....	....
Syracuse Lighting, 7% pf.	105½	103	107
Syracuse Lighting, 8% pf.	115	....	....
Syracuse Lighting, 8% com.—no par	300	....	....
TAMPA ELEC., com. $2	63	49	63½
Tenn. Elec. Pwr., 6% pf.	96½	92	94½
Tenn. Elec. Pwr., 7% pf.	107	103	106½
Terre Haute, Ind. & East. Trac., 5% pf.	20	20	25
Terre Haute, Ind. & East. Trac., com	1	1	3
Tex. Pwr. & Lt., 7% pf.	*l*109	106	108
Tide Water Pwr., 8% pf.	108	105	108
Timken Roller Bear., com.—$4 no par.	98½	78	99½
Toledo Edison, 8% pf.	*l*116½	115	118
Toledo Edison, 7% pf.	*l*100	99	100
Toledo Edison, 6% pf.	*k* 96	95	97
Toledo Edison, 6% com.	100	....	....
Tri-City Ry. & Lt., 6% pf.	95½	90	97
UNITED GAS & ELEC., 6% pf.	106	98	101½
United Gas & Elec., com.—no par.	*m* 57	....	....
United Gas & Elec. (N. J.) 5% pf.	72	70	73
United Gas Impr., 8% com.—50	*c*108½	89½	108½
United Lt. & Pwr. pf.—$4—no par.	52	50½	53
United Lt. & Pwr., pf.—$6.50—no par.	97	87	97½
United L. & P., com. A .48—no par.	14½	12½	15½
United L. & P., com. B .48—no par.	*k* 17½	16	18
Utah Pwr. & Lt., 7% pf.	*l* 108½	104	108
Utica Gas & Elec., 7% pf.	*l*106	105	106½
Utica Gas & Elec., 8% com.	200	....	....
Utilities Pwr. & Lt., 7% pf.	95½	93	98
Utilities Pwr. & Lt., com. A $2	32½	27	34
Utilities Pwr. & Lt., com. B $1— no par	17½	13½	19
VERMONT HYDRO-ELEC., 7% pf.	97½	95	97½
Virginia Elec. & Pwr., 7% pf.	107	105	107
Virginian Pwr., 7% pf.	108	....	....
Virginian Pwr., com.	70	....	....
WAGNER ELEC., 7% pf.	*b* 88	68	88
Wagner Elec., com.—no par	*b* 34½	18½	34½
Washington Ry. & Elec., 5% com.	238	....	....
Washington Ry. & Elec., 5% pf.	90	....	....
Washington Wtr. Pwr., 8% com.	150	136	140
West Penn Elec., 7% pf.	109	102	110
West Penn Elec., Cl. A $7.	105½	97½	110
West Penn Pwr., 7% pf.	115	111	115½
West Penn Pwr., 6% pf.	106	100½	107
West Virginia Lt., Ht. & Pwr., 7% pf.	90	94	96
West Va. Utilities, 7% pf.—50	49½	48	51½
Western Pwr., 7% pf.	100½	97½	102
Western States Gas & Elec., 7% pf.	99	96	98
Western States Gas & Elec., com.	21	....	....
Westinghouse Elec. & Mfg., 8% com. —50	77	67½	77½
Weston Elec. Instrument, Cl. A $2 —no par	*k*32½	30½	34½
Weston Elec. Instrument, com.—no par	15½	15	18½
Wheeling Elec., 6% pf.	100	95	97
Worthington Pump, 7% pf. A	59	46	59½
Worthington Pump, 6% B	50½	40	50½
Worthington Pump, com.	39½	20½	39½
YALE & TOWNE com. $5—25	76½	70½	77

Stock Exchange: *a*Chicago; *b*St. Louis; *c*Philadelphia; *d*Boston; *e*Baltimore; *f*Montreal; *g*Cincinnati; *h*San Francisco; *i*Pittsburgh; *j*Washington. *k*Bid price Saturday, May 21. *l*Bid price Wednesday, May 25. *m*Latest quotations available. †Dividend rate variable.

other economists have proved that common stock, the basic equity, is a more profitable investment and more remunerative than a preferred stock or a bond. This is only true when the financial structure is such that the equity bears a large ratio to the bonded debt, for if it does not, in periods of business depression there may result a receivership which would terminate the very existence of the common stock of the company concerned.

The public utility industry, in its wonderful progress, should be particularly watchful during times of ease in financing. Many a strong company with abundance of cash and credit has been wrecked by their improper use. Some public utility companies are today engaged in extending interconnections where the advantages cannot be realized for many years to come. As these lines, properly constructed, cost millions of dollars, careful study should be given to their necessity and value—the same consideration as is given to the extensions to power plant. The cost of electrical energy does not stop at the current delivered to the busbars in the station or to the customers' premises, but after final returns on invested capital necessary to the enterprise as a whole. It is as important to provide proper continuous returns on invested capital as to provide for the proper physical operation of the property.

As the industry, which is now rapidly approaching the railroads in size and importance, continues to grow, the responsibility of those directing it becomes greater. It is vital that in this period of rapid expansion each capital expenditure be carefully analyzed as to its merit and the effect it will have on the future results. Under such conditions the electrical industry can continue to develop on the same sound foundation which it has built up during the years past.

Financial Details of Pacific Gas Merger

With the filing of an application to the California Railroad Commission by the Pacific Gas & Electric Company and the Standard Gas & Electric Company asking the commission's approval of the deal by which the Pacific Gas is buying Coast Valleys Gas & Electric Company, Western States Gas & Electric Company and Sierra & San Francisco Power Company (announced in the ELECTRICAL WORLD for May 7, page 978), financial details of the transaction became known May 20. The Pacific Gas proposes the delivery to the Standard Gas & Electric Company of 260,000 shares of Pacific Gas common and $2,085,000 cash. The stock has a par value of $6,500,000, and while the application does not set forth the actual price, it is believed that the Byllesby interests will receive the stock

at about the market price at the time the deal was first announced, which was about 33. The price now is about 37.

The application lists $27,029,700 par value of stocks to be acquired by Pacific Gas as follows: $20,000,000 par value common of Sierra & San Francisco Power Company, representing the entire issue; $3,000,000 par value common of Coast Valleys Gas & Electric, representing the entire issue; $751,500 par value common of the Western States Gas & Electric of California; $3,253,200 par value common of the Western States Gas of Delaware, and $25,000 par value of stock representing the entire issue of the Del Monte Light & Power Company.

Included also in the deal is the transfer of power sites on the South and Middle Forks of the Feather River capable of developing approximately 350,000 hp., and on which about $500,000 has been expended to date, and delivery by the California-Oregon Power Company (Byllesby) to Pacific Gas of 10,000 kw. of hydro-electric power beginning within one year, for a period of 25 years.

Worcester Electric Light Company Forms Voting Trust

The stockholders of the Worcester Electric Light Company of Massachusetts have been asked to deposit their stock with trustees as a protection against immediate sale of the company, and an upset price of $225 per share with par $25 is named as the basis of future sales negotiations.

Boston Edison Issue Ratified

Shareholders of the Edison Electric Illuminating Company of Boston have ratified the issue of new stock, permission for which was recently granted by the Massachusetts Department of Public Utilities. The department authorized the issue of 66,374 shares of common stock at a price of $215 per share, which makes a total of $14,347,810. The proceeds of this issue will be applied to the reduction of indebtedness incurred in plant development.

The company petitioned to issue 93,429 shares at a price of $190 each, but the board declared this price too low to be consistent with the public interest and also ruled that items totaling $3,445,526 are uncapitalizable.

New Shares Issued.—The International Power Securities Corporation issued 75,000 shares of six-dollar cumulative preferred stock, series A, of no par value, consisting of one share of six-dollar preferred stock, series A, and one share of common stock.

New Canadian Holding Company Issues Stock.—The Foreign Power Securities Corporation, Ltd., the organization of which was discussed in the May 21 issue of the ELECTRICAL WORLD, made an offering of 6 per cent cumulative participating preferred stock to the amount of $2,500,000. The offering price was 100 and interest (carrying a bonus of one-half share of common with each share of preferred.)

Italy Forges Ahead in Power Development

BY C. E. GRUNSKY*

WHILE American loans and investments in Italy would undoubtedly be affected to some extent by any extended or critical period of hard times, the general opinion seems to be that the investments to date are well secured and conservative. The power-company loans are apparently thoroughly sound, being based, most of them, on improvements already made and on markets already gained rather than on speculative developments. Although the power demand must also be expected to fluctuate to some extent by reason of hard times, the domestic market has as yet been hardly touched. There is, in any circumstances, a big future for the Italian power industry. Whether the more recent smaller industrial loans and investments are safe or not, time only can tell.

It is interesting to note the signs of engineering activity which have followed the wake of the Mussolini régime. Not that the development has been quite so startling as was first reported. Railway electrification, for instance, which was proposed as a coal-saving measure, has not been continued at the initial pace. In view of the present price of coal, about $9 per ton, a figure comparable with pre-war prices, further electrification cannot be justified as an economic measure. To date about 600 of the proposed 2,000 miles (or, as sometimes stated, 6,000 miles) has been electrified. Italian engineers state that under present conditions car-mile costs are heavier than with coal operation, but that over mountain routes, when all elements of cost are taken into account, there is an advantage in favor of the electrified road, mainly for the reason that electrification has made possible the more efficient use of the roadbed and has in consequence deferred the necessity of building new lines. Military importance of the road is, moreover, an important factor justifying electrification and even operation at a loss. Italy being entirely without coal or oil resources, the experience of the Great War showed that only electrified roads could be operated at any reasonable cost during a war period.

MANY OTHER HYDRO DEVELOPMENTS

Hydro-electric developments since Mussolini has taken charge of affairs have been of particular importance in the line of engineering work. This was well begun before the war and resumed with renewed energy after the interruption caused thereby. Here, too, the personal influence of Mussolini has become apparent. With insistence on safety to insure the protection of investments, meritorious projects were promptly approved and moderate state aid was assured. This has taken the form of a bonus amounting to 40 lire per horsepower for a term of fifteen years (capitalized this amounts to about 300 lire as against a development cost of about 2,000 lire per horsepower). The hydro-electric development was, of course, accompanied to no small extent by the construction of storage reservoirs for the regulation of stream flow, which not infrequently involved adjustment with the holders of irrigation water rights, who guard these with utmost vigilance. The territory acquired by Italy from Austria has been an area of particular activity because while in Austria's possession the development of energy for the convenience of the Italian market was not permitted and stream flow remained unused. On the Italian territory along the Alps the development with natural stream flow had early reached its limits. Thereupon reservoir construction and utilization of what were theretofore waste waters increased and gave better control to the power output. Steam-power plants which had served to supply the deficiency of power at the low stages of the stream were thrown out of service. However, as the demands of all Italy for power increased, further installations (bringing the total to about 2,500,000 hp.) were made for fuller utilization of the peak stream flow in spring and early summer. A new period of minimum energy output in the fall and winter then appeared and caused a new demand for the standby station. The steam plants were called into service again.

It had been hoped that the increasing use of hydro-electric energy would result in a material decrease in coal consumption. This hope has not, however, been realized, because the increasing demand for power which has accompanied the hydro-electric developments has more than offset reduction of coal consumption at the points where steam power has been displaced by electrical energy.

The extension of government aid has not been restricted to hydro-electric projects. It has been made a general policy where the development of natural resources is in question. But it does not in all cases take on the same form. Thus, for example, the irrigation enterprise gets the benefit of the government loan of 45 per cent of its cost to be repaid in ten years. Where land drainage is involved, the government advanced 75 per cent of the cost of the project for a longer time. Government loans of this type are made at 3 or 3½ per cent interest rates.

*From an article on the current situation in Europe.

Customer Stock Sales for March Total $29,500,000

According to returns received by the ELECTRICAL WORLD from electric light and power companies selling stock directly to their customers and employees, the number of shares sold during March is estimated at 350,000, valued at $29,500,000 and involving 33,600 transactions. This is an increase from the sales in February, which amounted to 204,000 shares, at $15,700,000, in 22,500 transactions. The values do not differ materially from those for the corresponding months last year, but the number of transactions was decidedly smaller, the average amount involved having increased monthly. In December it was about $540, in January about $600, in February about $700, and in March it was close to $900.

Manufacturing and Markets

Commercial Aspects of Appliance Industry

THE tremendous market for appliances is pointed out in the following articles for the ELECTRICAL WORLD written by leaders of the industry. A real vision of the market is said to be needed as well as a realization of the sales resistance to be overcome, a first-class merchandising appreciation of what ought to be done and the putting forth of an adequate sales effort to do it. The present spirit of progress now so manifest is referred to as an aid to the industry and the future course of the industry is said apparently to lie in the direction of lower prices, more efficient products and better service and educational work. The appliance business is believed to be particularly favored and to possess bigger sales opportunities ahead with an enormous increase of business. In the refrigeration branch a sales increase is anticipated for a number of years and it is thought that the present seasonal tendency can be eliminated.

Merchandising Leadership

BY GEORGE A. HUGHES
President Edison Electric Appliance Company, Inc.

ONE of the most encouraging signs in the central-station industry is commercial awakening of its leaders to the vast possibilities of electricity in the home. While industrial power overshadows everything by its great

G. A. HUGHES

kilowatt output, it has been scarcely realized that the revenue from domestic appliance load even now is running at $150,000,000 per year, or nearly one-third that of industrial power. Yet we have scarcely scratched the surface. The average domestic bill for electricity is less than the price of a fair cigar a day—and only one-third of this is for appliances.

The electric range business nearly doubled last year and taxed manufacturing facilities, but relatively few central-station companies are enjoying the profitable revenue produced by the electric range. The situation calls for a real vision of the market, a realization of the sales resistance to be overcome, a first-class merchandising appreciation of what ought to be done, and the putting forth of an adequate sales effort to do it.

The commercial development of the National Electric Light Association into a continuous planning and organizing instrumentality for concerted action will prove a great benefit. For example, the concurrent advertising of heating-device manufacturers with concurrent campaigns sponsored by the commercial section of the N.E.L.A. has already resulted in substantially increasing the use of appliances and points the way to what can be accomplished by concerted action where all play together for the common interest. Logically, each central-station company must assume the merchandising leadership in each locality and secure the full co-operation of the other merchandising interests. A narrow merchandising point of view will greatly limit the development of the electrical idea.

I would like to repeat what I have said before. The constructive forces in the public service industry now working for increased nationally directed merchandising activity and better co-operation with dealers, together with better promotional rates for the larger load building appliances, will bring a greater use of electricity in the home. A revenue to the public service companies of $150 per year per home is not impossible. Every electrical manufacturer and dealer can profitably play his part in working toward this goal—the universal adoption of the idea of the complete electric home.

In the meantime, the practical bogey set by the N.E.L.A. merchandising committee of an increase of 1 kw.-hr. per day per residence, bringing the revenue up to fifty or sixty dollars per year, is not unreasonable to expect in the near future.

Spirit of Progress Aids

BY E. G. BIECHLER
President Frigidaire Corporation

IT IS as impossible today to vision what the future holds in the way of improved living conditions as it was twenty years ago to forecast the actual development of the automobile, radio, telephone and hundreds of other utilities now accepted as a matter of course. Many of the important developments of the future will no doubt come from the electrical field. It is favored by the efforts of scientists and engineers, and the public has already learned to turn to it for new methods of servicing its needs. There was never a time when people were so ready as now to change from the old to the new. There was never a time when the spirit of progress was so manifest in all classes. Every new device which offers a time, labor or money-saving service is eagerly accepted by great masses of people.

E. G. BIECHLER

The future course of the industry apparently should be directed toward lower prices, more efficient products, better service and more intensive educational work. All bring wider markets, expanding in geometric ratio to expenditure of effort made in their cultivation.

Five years after the first automobile was built there were only slightly more than 21,000 in actual use. It took this great industry a number of years to win the confidence of the public. When at last it won almost universal acceptance, it was precisely through methods and policies indicated above.

Appliance Industry Favored

BY T. C. RUSSELL
President Russell Electric Company

NO INDUSTRY is quite so favored as the electric appliance industry, because the entire cost of promoting and creating the demand for the merchandise does not all have to come out of the profits from the sale of the merchandise itself. As the industry becomes better organized and better appreciates these unique advantages there will be closer co-operation than we have had in the past and all of us will make more money.

Great strides have been made in the last two years in the co-ordinated advertising campaigns sponsored jointly by appliance manufacturers and the electric service companies, and almost universal satisfaction has been expressed as a result of these campaigns. It is nothing unusual for a manufacturer during a campaign month to sell a greater number of the campaign

products than he previously sold in an entire year, and during the rest of the year because of this stimulation the demand for the same product was increased rather than decreased. These campaigns are but the beginning of a new era of co-operative effort in the industry. The biggest sales opportunity has still been overlooked.

It is freely acknowledged by all merchandising experts that no matter how much you advertise or how much demand you create it still amounts to nothing unless it is coupled up with supply. The more places that this supply is available, the greater the sales will be. The retail stores of electric service companies probably do not represent 1 per cent of the available retail outlet for electric merchandise. The big idea—the job ahead of us—is to tie in these tens of thousands of dealer outlets with our co-ordinated campaigns, and with our potential sales outlets multiplied a hundredfold the potential increase in sales is simply staggering.

Power Company Co-operation

The manufacturer's entire source of income depends on his volume of profitable sales. This is equally true of the dealer. It is not at all true of the electric service companies, or certainly should not be. Their prime interest and their opportunities for profit do not lie in selling merchandise but in getting load-building appliances on their lines. What is more obvious than that the power companies give their fullest co-operation in helping the dealers to make sales. They can multiply their outlets manyfold, and the thing they are primarily interested in, namely, maximum sales of appliances in their territories, will be tremendously increased.

These sales must be profitable sales to the dealer, for he cannot carry on without a merchandising profit, so the power companies should utilize all their influence and advantages to help the dealer buy right, which is necessary before he can sell right. Power-company advertising at regular intervals should carry the names of all the reputable dealers where their advertised merchandise can be obtained. The expense is inconsequential when compared to the benefits. The power company should bear the major load of local advertising to create the demand for the merchandise—not for sentiment's sake, but for good business' sake. Dealers with this co-operation would take a renewed interest in the sale of appliances. More dealers would handle appliances and the enthusiasm generated would all make sales—and more sales.

The by-products of this policy alone are worth the entire expense of the advertising. Think of the good will that would be created if every dealer should see such concrete evidence of the sincere desire of the electric service company to co-operate and play the game. A desire expressed not in the form of pretty speeches and slogans, but in the form of paid advertising carrying his name, insuring sales and profits for the dealer. If the power company gives long extended time payment to its customer, it is not with the idea of making sales but to get more electrical appliances on its lines. The appliance the dealer sells uses just as much energy as the one sold by the utility company, and if it is good business for the utility company to give extended terms, it is equally good business to assist the dealer to meet these same terms at a profit.

Some of these ideas may seem rather visionary, but at the same time they are not new. Various phases of them are working successfully in different parts of the country. The big thing is to make this a national policy among electric service companies—one that will work everywhere and all the time; namely, fullest co-operation with the dealer will promote maximum sales, will develop maximum load for the utility, will make maximum profits for the dealer and will create maximum public good will. It will pay every utility to adopt this policy, not for sentiment's sake, but for good business' sake.

Refrigeration Field Growing

By A. H. Goss
President Electric Refrigeration Corporation

ELECTRIC refrigeration today is without doubt an accepted fact, not only in the United States, where it has reached a higher development from a sales standpoint, but also throughout those parts of the world in a position to accept readily such a new device. Electric refrigeration in its modern conception is a new idea, for while some of the older manufacturers have been actively in business for years, 1922 really marked the end of the experimental stage and the beginning of intensive production and sales activities.

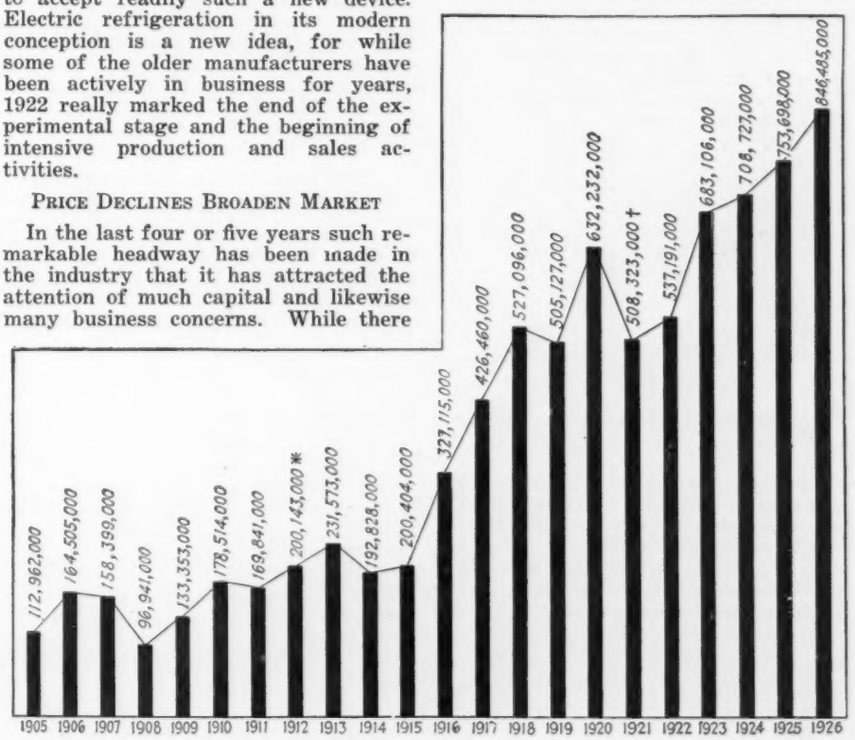
Price Declines Broaden Market

In the last four or five years such remarkable headway has been made in the industry that it has attracted the attention of much capital and likewise many business concerns. While there are probably upward of fifty concerns in the industry at the present time, the bulk of the business is done by four or five companies. The larger companies, having the background of ex-

A. H. Goss

perience and being fortunate enough to command the necessary capital to meet the growing markets of the world, have expanded rapidly and are now enjoying the benefits of mass production. Prices to the consumer have declined to a point where a very broad market can be reached. Despite the entrance of many competitors in the field, the mechanical features remain fundamentally the same as originally designed. Refinement of minor parts,

Trend of Electrical Sales



Combined Electrical Sales of Allis-Chalmers Manufacturing Company, Crocker-Wheeler Company, General Electric Company, Graybar Electric Company, Western Electric Company and Westinghouse Electric & Manufacturing Company

(a) Munitions sales during the war years and non-electrical sales not included.
(b) Western Electric sales do not include purchases from or sales to any of the above companies.

*Fort Wayne, Sprague and National added to General Electric sales.
†Southwest. General Electric added and International General Electric omitted from General Electric sales.

simplification and attention to appearances have been the extent of improvements in the industry of late. The oldest and largest companies still adhere to the proved reciprocating type of machine. For domestic use (i.e., household) the self-contained unit is now the preferred choice, although a large volume of business continues to be done in the remote installation class. The self-contained models will undoubtedly remain popular in the future.

The industry is a seasonal one, and its principal problem is to eliminate this tendency. There are three factors which will help in this movement: Awakening of public consciousness to the necessity of year-around refrigeration, intensive development of export business, and active pursuit of commercial applications, such as for meat markets, groceries, restaurants, florists, etc. Regardless of the now seasonal nature of this industry, the potential market for electric refrigeration is so large that the much discussed term "saturation point" is rarely thought of in this industry. We continue to expect a growing demand, resulting in sales increase for the next several years at least.

Central-Station Influence

One of the contributing factors to the growth of electric refrigeration has been the readiness with which the central station industry has placed its influence behind the sale of electric refrigerators because of their well-known load building features. It is reasonable to assume that as mechanical efficiency is proved and stability of manufacture is established greater co-operation with the utilities will result.

Business Conditions

BUSINESS in the electrical industry continues at a fairly steady rate. There has been a very slow decline for the last three or four months, but inquiries on hand and contemplated projects would indicate a period of high activity during the latter part of the year. A good demand for motors is reported and central-station companies are buying supplies in steady volume. Several negotiations covering large orders are still under way.

In New England motor and industrial heating sales are active. Several carload sales of line material are reported as well as a fair demand for meters, transformers and wiring supplies. Central-station buying in the New York district is slow, but several large turbo-generator inquiries are still active. Sales show an improvement in the Southeast, with central-station companies purchasing in better volume. A reasonable amount of line-construction material orders is being placed. Motors and transformers are in demand by industrial plants in the St. Louis district. Sales in the Middle West are expected to reach a good total during May. On the Pacific Coast power and machinery apparatus orders are in fair volume.

Copper Sales Improve at Lower Prices—Lead Declines

Copper prices have been driven down close to 12¼ cents by forced selling but a fair amount of business was secured. Lead prices have declined further but most sellers have found a satisfactory market in other respects. Zinc has refused to break lower but cannot be said to be particularly firm.

NEW YORK METAL MARKET PRICES

	May 18, 1927 Cents per Pound	May 25, 1927 Cents per Pound
Copper electrolytic	12.875	12.525
Lead, Am. S. & R. price	6.65	6¼
Antimony	12½	13¼
Nickel, ingot	35	35
Zinc spots	6.35	6.35-6.375
Tin, Straits	67.379	67¾
Aluminum, 99 per cent.	26	26

Base copper price May 25, 1927, 14¾ cents.

Motor and Industrial Heating Sales Active in New England

Sales of motors continue vigorous in the New England district, orders being widely scattered and extremely diversified. A price readjustment of about 10 per cent reduction was announced in one classification a few days ago, but in general prices are steady in the power apparatus field. New uses for fractional-horsepower motors are gradually expanding the market. Deliveries are practically out of factory stock on all standard lines. Industrial heating equipment is also moving exceptionally well. In the central-station field jobbers report several carload sales of line material, and a fair demand for meters, transformers and wiring supplies for company use.

Central Station Buying Shows Decrease in New York District

Central-station buying in the New York district is slow, and several manufacturers report sales this month have fallen below those of last month. The demand for transformers has decreased but several active turbo-generator inquiries have not yet developed into sales. Switching equipment and circuit breaker sales are somewhat stronger but the volume of business is below that of the corresponding period last year. Poles, crossarms and line hardware continue in fair demand but individual orders are small. Industrial buying is good and small and medium-sized motors for general industrial purposes find a ready market. A manufacturer of motors reports a large increase of business this month over the previous month. An increasing demand is also noted for control apparatus.

Sales Show Improvement in Southeast

Sales in the Southeast show some improvement with central-station companies purchasing in better volume, though few individual large orders are reported. One company placed orders for switching equipment totaling $9,661 and cable, guy and copper wire orders amounting to $7,260. An order for transformers amounting to approximately $50,000 is in prospect and will undoubtedly be placed this week. A reasonable amount of line construction material orders are being placed. Transformers are being ordered in fairly good volume though none of the individual orders are large. One company placed orders for small power and distribution transformers amounting to $4,350 and watt-hour meters costing $3,250.

Industrial plants generally are showing satisfactory activity, with the textile field particularly brisk. One textile mill electrification contract was closed in Georgia and this job will call for approximately $35,000 worth of wiring materials, motors and transformers, orders for which have already been placed. Another textile electrification job is in immediate prospect and announcement will probably be made within the next few weeks. This latter electrification will call for electrical materials in the neighborhood of $50,000. Power contract has been recently signed for a new horse-shoe mill with a guaranteed demand of 400 kw., but electrical equipment for this plant has not yet been purchased, though it will be shortly.

Sales in Middle West to Reach Good Total During May

A slight improvement of business is noted in the Middle West. While industrial activity is somewhat spotty, it is felt that conditions will soon improve and that the month in sales will be good. The various utility companies continue with construction work and although purchasing of apparatus has declined somewhat a good deal of general buying is taking place. Economy is the keynote and a general tightening up on expenditures is noticeable. Several sizable quantities of paper insulated and lead covered cable are to be purchased in a few days and the demand for distribution materials is quite heavy. Jobbers report a fair volume of business transacted with considerable municipal business being obtained.

Motors and Transformers in Demand in St. Louis District

No marked change is noted in general conditions in the St. Louis district. Manufacturers of small and medium-sized motors are working full time on contracts for monthly delivery of fractional-horsepower motors for domestic refrigerators, automobile sets and other appliances. An order for railway generating equipment totaling $35,000 was booked for shipment to the southwestern part of the district. An order for immediate shipment of oil-pumping equipment, which was being held for the purchaser's convenience, perhaps indicates renewed activity in the oil fields. The larger manufacturers all report that the demand for medium-sized motors and transformers for industrial plants continues in good volume. The St. Louis Water Department is sending out specifications for two 300-kw. generating units for service in the new pumping station on the Missouri River.

Power Apparatus Orders in Fair Volume on Pacific Coast

Machinery and power apparatus orders on the Pacific Coast are good, and are being received from varied industrial plants. Sales include three motors of 350 hp. each, totaling $12,000, for a Sacramento sewage disposal system, 25 assorted motors valued at $10,000, for a rock crushing company, two feeder voltage regulators, amounting to $4,000, for a small power company of central California, and 276 street lighting units amounting to $10,000. Power company inquiries have covered one carload of crossarms, three assorted carloads of poles, mainly large size, two carloads of 60-kv. pin type porcelain insulators, and 3,000 ft. of 500,000-circ. mil, 600-volt, lead-covered, paper-insulated cable. Many small job orders are being placed in the State of California, and fan and pumping motor business has been slightly improved by a week of warm weather.

Additional generating equipment will be purchased by the Grays Harbor Railway & Light Company to care for industrial expansion in Hoquiam and the Grays Harbor district. The Puget Sound Power & Light Company has purchased two 2,000-kva. transformers and miscellaneous equipment for its Olympia plant for supplying current to recently completed pulp and paper mills in that city. Seattle jobbers report motor sales have decreased 25 per cent.

Activities of the Trade

General Electric Company Gets State Line Transformer Order

The State Line Generating Company, Chicago, has placed an order with the General Electric Company for seventeen single-phase transformers aggregating 340,000 kva., and four three-phase units aggregating 80,000 kva. These units will be all tap-changing under load. The General Electric Company also received last year from the State Line company an order for a 208,000 kw., 18,000-volt triple turbo-generator set. The State Line generating station is being erected on the Illinois-Indiana boundary and will be a very important factor in the Insull system in the Middle West.

Other orders placed in the last two weeks for General Electric transformers for ratio control under load total approximately 290,000 kva. The Public Service Electric Company of New Jersey purchased two 27,500-kva. units, the Commonwealth Edison Company of Chicago ordered nine 20,000-kva. units, the Dixie Construction Company bought one 20,000-kva. unit, and the Ohio Public Service Company ordered four 8,333-kva. units.

Minnesota Jobbers Form Consolidation

Consolidation of two large Minneapolis and St. Paul companies and one in Duluth, to be known as the Great Northern Electric Appliance Company, has been announced in Minneapolis by R. M. Laird, president of the new company. The three concerns included in this consolidation are the R. M. Laird Electric Company of Minneapolis, the St. Paul Electric Company of St. Paul and the Duluth Electrical Supplies Company. Mr. Laird was president of the three companies and will continue as head of the combined organization maintaining his office in Minneapolis. The St. Paul Electric Company owned and operated a branch house in Fargo, N. D., and this is included in the merger, thus giving the Great Northern Electric Appliance Company distributing facilities in the four largest cities of Minnesota and the Dakotas.

The three constituent units of the consolidation were agent jobbers of the Westinghouse Electric & Manufacturing Company, and the new corporation will serve as Northwest distributor for Westinghouse products. Wholesale business will be transacted exclusively, and the retail sales activities are to be discontinued, Mr. Laird announced. No changes will be made in the management or personnel of the three concerns united to form the Great Northern Electric Appliance Company, Mr. Laird declared. W. J. Jockers, formerly vice-president of the St. Paul Electrical Company becomes vice-president and general manager of the new corporation, with offices in St. Paul W. M. Hogan continues as manager of the Duluth Electrical Supplies Company, and Vern Hoar as manager of the Fargo division.

Landers, Frary & Clark, New Britain, Conn., manufacturers of electrical appliances, recently opened their new four-hundred-thousand-dollar manufacturing building with a house warming attended by about 3,000 people.

The Hart Manufacturing Company, Hartford, Conn., announces a new "Diamond H" heater switch with vitrified enamel cover and furnished for all-round base snap switches in capacities from 6 amp. to 30 amp.

The Miller Company, Meriden, Conn., manufacturer of lighting fixtures, announces the appointment of Michael Schwarz as president of the company. Mr. Schwarz has been with the company since 1912 and was formerly vice-president and general manager.

The Westinghouse Electric & Manufacturing Company announces the appointment of G. E. Wearn as central-station sales manager. Mr. Wearn will be stationed in New York City. For the last eleven years Mr. Wearn has been with the Westinghouse organization and has devoted his time to sales engineering work in the power department and the central-station division.

The Vac-A-Tap Company, Holland, Mich., has placed on the market a new design of electrically driven washing machine.

The Graybar Electric Company, Graybar Building, Lexington Avenue and Forty-third Street, New York City, announces the development of a new commercial lighting fixture which is made entirely of bakelite. The fixture is known as the "Shelcrest" and is made in both ceiling and hanging types. No metal is employed, except in the chain.

The Eureka Vacuum Cleaner Company, Hamilton and Dewey Avenues, Detroit, announces the appointment of W. H. Wells as assistant general manager, with headquarters at Detroit. Mr. Wells was formerly division manager, stationed at the New York office.

The Andrews-Bradshaw Company, Pittsburgh, manufacturer of the "Tracyfier," announces the addition to its personnel of R. N. Robertson as chief engineer and A. L. Menzin as director of research. Mr. Robertson comes from the American Smelting & Refining Company, having been with that concern for the past 20 years, and Mr. Menzin for some years has been chief engineer of the Tracy Engineering Company and prior to that consulting engineer with the Edge Moor Iron Company.

The General Electric Company has received an order from the Chicago, North Shore & Milwaukee Railroad for two 65-ton electric trolley storage-battery locomotives. The electric locomotives will be able to operate from the trolley or from the storage batteries which they carry and can charge their batteries from the trolley while operating. The locomotives will be equipped with "Exide Ironclad" storage batteries.

The Edwin F. Guth Company, St. Louis, manufacturer of electric lighting fixtures, announces that Robert B. Ely has been appointed manager of the central-station division. The company states that this new division is being organized to prepare plans for co-operative lighting activities with the central-station companies for the development of the lighting business. Mr. Ely was formerly manager of the sales promotion department of the Westinghouse Lamp Company at New York and prior to that time was associated with the Philadelphia Electric Company for many years.

The Triangle Electric Company, Chicago, jobber, announces that about June 15 it will move to greatly enlarged quarters in its own five-story building at the corner of Adams and Jefferson Streets. The space to be occupied by the company will exceed 125,000 sq.ft. and a special display room is being equipped.

The Roller Smith Company, 233 Broadway, New York, manufacturer of electrical instruments and circuit breakers, announces that William H. Neville, Age-Herald Building, Birmingham, Ala., will represent the company in the state of Alabama and that the Atkinson Equipment Company, Atlanta Trust Company Building, Atlanta, Ga., will be sales representative in Georgia.

The Lapp Insulator Company, Inc., Le Roy, N. Y., announces that since May 1 it has established its own district office at 140 South Dearborn Street, Chicago, with Brent Mills as manager. The company plans to maintain a stock of insulators for prompt service from Chicago and will carry on hand such styles as are generally used for low-voltage distribution.

New Trade Literature

AIR COMPRESSORS AND VACUUM PUMPS.—Bulletin No. 132 issued by the Pennsylvania Pump & Compressor Company, Easton, Pa., describes the Pennsylvania eclipse air-cushioned-valve air compressors and dry vacuum pumps of the straight-line, single-stage, double-acting types. Illustrations are given showing various applications of both the air compressors and vacuum pumps. Specifications of both the air compressors and vacuum pumps are included.

SWITCHES.—Bulletin No. 208 issued by Schweitzer & Conrad, Inc., 4435 Ravenswood Avenue, Chicago, describes and illustrates its "Pantograph" multiple-pole, air-brake, gang-operated disconnecting switches, and also combinations with choke coil, fuse mounting and grounding switch. Illustrations are given showing the construction and operating features of the "Pantograph" switch and also various applications of same.

CONNECTOR.—The Cooper Hewitt Electric Company, 95 River Street, Hoboken, N. J., is distributing bulletin No. 600, describing the Cooper Hewitt mercury "Konnec-tor" for use in sign flashers, relays, time clocks, motor controls, heat-control devices, thermostatic switches, etc. Illustrations showing various applications of the "Kon-nec-tor" are included.

FOOD MIXER AND VEGETABLE PEELER.—Bulletins No. 601A and 901 issued by the Reynolds Electric Company, 2650 West Congress Street, Chicago, cover the "Reco" mixer and kitchen machine and the "Reco" vegetable peeler respectively, for commercial use.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

An agency is desired in Tokyo, Japan (No. 25,513), for electric refrigerators.

An agency is desired in Augsburg, Germany (No. 25,556), for ice-making and refrigerating machinery.

Purchase is desired in Singapore, Straits Settlements (No. 25,573), of a complete ice-making plant with storage room of 1-ton daily capacity.

Purchase is desired in Traiguen, Chile (No. 25,705), of batteries and flashlights.

Purchase and agency are desired in Mannheim, Germany (No. 25,656), for electrical clothes brushes and household appliances.

An agency is desired in Manila, Philippine Islands (No. 25,701), for underground cable.

Purchase or agency is desired in Montreal, Canada (No. 25,604), for electric dishwashers.

An agency is desired in Cardiff, Wales (No. 25,657), for electrical dishwashing, sterlizing and drying machines.

Purchase and agency are desired in Rio de Janeiro, Brazil (No. 25,605), for electric household appliances and farm lighting plants.

An agency is desired in Berlin, Germany (No. 25,607), for electric household appliances and fractional horsepower motors.

An agency is desired in Antwerp, Belgium (No. 25,710), for electric household appliances and refrigerators.

Construction News

Projects, Plans, Bids and Contracts Contemplated or Under Way

New England States

ATHOL, MASS.—The Athol Manufacturing Company plans to install electric generating equipment to supply electricity to operate its mill. The equipment will include a 200-hp. generator.

FITCHBURG, MASS.—The substation of the New England Power Company, Worcester, was recently damaged by fire, causing a loss of about $25,000.

WILLIMANTIC, CONN.—The installation of an ornamental lighting system on Main Street is under consideration by the City Council.

Middle Atlantic States

BUFFALO, N. Y.—The contract for a new lighting district in Hamburg, extending from the Big Tree Road to the Lake Road, has been awarded to the Buffalo General Electric Company. Several new extensions on the 4,000-volt lines in Clarksburg and Langford will be made by the Buffalo General Electric Company.

GOVERNORS ISLAND, N. Y. — Bids will be received by the Signal Corps Procurement District, Governors Island, until May 31, for two motor generators (Circular 91). Also, until June 3, for 300 telephone transmitter heads (Circular 92).

YONKERS, N. Y.—Plans have been filed by the Westchester Lighting Company for an addition to its plant on the Saw Mill River Road.

PHILADELPHIA, PA. — Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until June 7, for storage battery elements for the Philadelphia and Mare Island navy yards (Schedule 7262).

GLEN FERRIS, W. VA. — Application has been made to the Federal Power Commission by the New Kanawha Power Company for a preliminary permit for a hydro-electric development on Kanawha River between Charleston and Montgomery and for the construction of a dam on New River between Gauley Junction and Hawk's Nest.

CAPE CHARLES, VA. — The Eastern Shore Gas & Electric Company, Salisbury, Md., which has acquired the municipal electric distributing system, is making surveys for the erection of a high tension line from Machipongo to furnish electric service in Cape Charles.

North Central States

DETROIT, MICH. — Plans have been filed by the Briggs Manufacturing Company for a power plant at its works on Mack Avenue, in connection with an expansion program, to cost about $1,000,000.

CLEVELAND, OHIO.—Bids will be received at the office of the Commissioner of Purchases and Supplies, City Hall, until June 3 for cross-arms for the Division of Light and Power.

CLEVELAND, OHIO.—Bids will be received at the office of the Commissioner of Purchases and Supplies, City Hall, until June 3 for underground cable for the enlargement of the fire signal system, Department of Public Safety.

TOLEDO, OHIO.—Plans are being prepared for a power plant and mechanical laundry at the Toledo Hospital, in connection with an expansion program, to cost about $1,750,000. Schmidt, Garden & Erickson, 104 South Michigan Avenue, Chicago, are architects.

MAYSVILLE, KY. — The Kentucky Power Company, Augusta, plans extensions and improvements in its local electric plant.

CHICAGO, ILL.—Bids will be received by the Signal Corps Procurement District, Chicago, until June 8, for telephone system and supplies (Circular 35), for 50 telephone hand sets (Circular 37).

DUNDEE, ILL. — Authority has been granted the Illinois Public Service Company, Chicago, to extend its transmission lines from Dundee to Fox River Bluffs. The cost is estimated at $100,000.

MINNEAPOLIS, MINN. — Plans have been filed by the Minneapolis Manufacturing Company, Fifth Street and East Hennepin Avenue, for a power plant at its factory, to cost about $50,000. The Pillsbury Engineering Company, 2344 Nicollet Avenue, is engineer.

HENRIETTA, MO. — Arrangements are being made by the Missouri Gas & Electric Service Company, Lexington, for the erection of an 11,000-volt transmission line to connect its local substation with a number of power and lighting installations in the vicinity of Richmond. All of the present lines will be changed from 13,000 to 11,000 volt, four-wire system.

POPULAR BLUFF, MO. — Bids, it is understood, will be asked the latter part of June by the Black River Hydro-Electric Power Company, Popular Bluff, for the construction of a 10,000-kw. hydro-electric plant and dam near Piedmont, to cost about $4,000,000. The dam will be 140 ft. high, 1,400 ft. long at base and 2,000 ft. long at the top. W. A. Fuller, 1917 Railway Exchange Building, St. Louis, is engineer in charge.

DICKINSON, N. D. — Plans are under way by the Hughes Electric Company, Bismarck, for increasing the output of its local electric plant by 1,000 kw. New equipment, including a 1,000-kw. generating unit and additional boilers will be installed.

FREDONIA, N. D. — The Northern Power & Light Company, Mobridge, plans extensions and improvements, changing the local system from direct to alternating current.

WELLSFORD, KAN.—Bonds have been authorized for the erection of a transmission line to and a distribution system in Wellsford. It is proposed to connect with the transmission line from the Greensburg municipal plant which serves Haviland.

Southern States

AHOSKIE, N. C.—The Virginia Electric & Power Company, Richmond, which has acquired the local distributing system, contemplates improvements and the erection of a transmission line in this district.

BURLINGTON, N. C.—Plans are under way by the National Dye Works, Richmond, Va., to enlarge the power plant at its local works, at a cost of about $100,000.

COLUMBIA, S. C.—The Broad River Power Company is negotiating for electric franchises in Bowman and Rowesville.

FERNANDINA, FLA.—The Commissioners of Nassau County have granted the Southern States Power Company permission to erect transmission and distribution lines along the highways in the county. The company plans to build transmission lines connecting the twenty-four towns and villages in Nassau County with its main power station at Fernandina.

ALLEN, OKLA. — The Central States Power & Light Corporation, Davenport, Iowa, has approved plans for an electric power plant for local service.

FORT WORTH, TEX. — Bids will be opened at the office of the City Manager on June 6 for the installation of an ornamental lighting system on Main and Houston Streets. The plans call for 192 standards mounted with lamps of 1,000 cp., to cost about $70,000.

HENDERSON, TEX.—The City Council is considering the construction of a municipal electric plant, to cost about $75,000.

Pacific and Mountain States

EVERETT, WASH.—Plans under way by the City Council for a hydro-electric power project on the Sultan River, to develop about 50,000 hp. at a cost of about $1,500,000 with transmission system. J. E. Wickstrom, Goldbar, Wash., is engineer.

CORONA, CAL.—The City Council is considering the installation of an ornamental lighting system on Grand Boulevard, consisting of 173 lamps, to cost about $50,000. The Currie Engineering Company, Stoneman Building, Alhambra, is engineer.

ONTARIO, CAL.—The City Council is considering the installation of an ornamental lighting system on portions of Commercial Court, Laurel, Emporia and Lemon Avenues, and Transit Street, and for remodeling the present ornamental lighting system on Main Street. Otto S. Roen is city engineer.

SAN FRANCISCO, CAL.—Bids will be received by the Signal Corps Procurement District, San Francisco, until June 21, for 4,160 batteries (Circular 10).

SAN FRANCISCO, CAL.—The lighting committee of the Board of Supervisors has authorized the installation of a new lighting system on Fillmore Street, between Fulton and Sacramento Streets and has approved the placing of new lamps in new residential sections. The Down Town Association has petitioned the lighting committee to provide better lamps in the section between Van Ness Avenue, Market and California Streets.

EPHRAIM, UTAH. — The City Council has called a special election June 14, to vote on a bond issue of $40,000, for a municipal hydro-electric plant.

CHIWAUKAN, WASH. — The Cascade Power Company, Seattle, has applied for permission to use water from the Wenatchee River and from Lake Isabel for a proposed hydro-electric power development in the Tumwater Canyon section, near this place, to cost about $5,000,000.